FEDERAL TELECOMMUNICATIONS MARKET

1990 - 1995

INPUT

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**Federal Information Systems and Services
Program (FISSP)**

*Federal Telecommunications Market,
1990-1995*

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Abstract

INPUT estimates that the federal government telecommunications market will increase from $4.2 billion in FY 1990 to $5.9 billion by FY 1995, an annual growth rate of 6%.

Most federal telecommunications expenditures remain concentrated in leased telecommunications services. Agencies continue to experience procurement problems in the postdivestiture environment. Purchases have been delayed by reorganization issues and staff shortages as well as by a reluctance to accept new technology.

Budget constraints under the Gramm-Rudman-Hollings Act continue to affect procurement considerations; however, growing acceptance of FTS 2000 will alleviate some of the difficulties.

This report highlights major telecommunications initiatives scheduled for implementation over the next five years with emphasis on GSA's FTS 2000 and consideration of the need for new technologies such as VSATs and cellular communications, and network services such as E-Mail and Electronic Data Interchange.

The report also examines the impacts of regulation, policy, and standards on future telecommunications acquisitions. Other major issues covered in the report include OSI standards, technological impacts, and competitive trends.

The report contains 190 pages, including 65 exhibits.

FEDERAL
TELECOMMUNICATIONS
MARKET 1990-1995

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Introduction

INPUT has prepared this revised report on telecommunications systems and services in the federal government as part of the Federal Information Systems and Services Program (FISSP).

Research for this revision is based on new analysis of the INPUT Procurement Analysis Reports (PARs) and previous INPUT research for reports prepared in 1986, 1987, and 1988. Additional research included: review of federal procurement documents, review of federal information technology budget plans, and analysis of current issues in the trade press.

A
Scope

Analysis in this report addresses telecommunications system and services programs listed in the OMB/GSA/NBS Five-Year Plan for government fiscal years (GFYs) 1990-1995, related long-range information resource plans, and federal agency GFY 1989 and 1990 information technology budgets.

Earlier versions of the *Federal Telecommunications Market* report included data gained through interviews with government and vendor personnel. Applicable elements of the interview data have been retained for the 1990 version.

Agencies selected for new interviews include those that currently use telecommunications services or products. Contractors who were active in federal telecommunications programs or are listed as vendors of telecommunications services or products in INPUT's Vendor Analysis Program data base for 1990, were selected for interviews.

B
Methodology

INPUT analysts reviewed the OMB/GSA/NBS Five-Year Plan and the INPUT Procurement Analysis Reports for communications programs initiated during government fiscal years 1990-1995.

INPUT also examined agency A-11 submissions for fiscal years 1990 and 1991 for additional information on communications requirements embedded in distributed data processing and office automation programs.

The available agency long-range ADP plans for GFY 1990-1994 and 1991-1995 were also reviewed to identify plans for forthcoming major telecommunications systems and services contracts.

For both previous and current versions of the *Federal Telecommunications Market* report, INPUT developed questionnaires for interviewing federal agency officials and telecommunications vendor executives. The agency questionnaire was designed to obtain information about plans for future use of telecommunications systems and services.

The vendor questionnaire was designed to obtain information about current and future plans from major vendors of telecommunications products and services. Both questionnaires included similar questions about contracting policy and preference, technical standards, and vendor performance perceptions. Copies of the agency and vendor questionnaires are included in Appendix G.

Federal agency officials selected for interviews included executives (policy makers) and program managers (users). Vendor representatives selected for interviews included company executives and high-ranking marketing personnel.

C
Report Organization

Following this introduction, the report is divided into six sections.

Chapter II - An Executive Overview summarizes the major points and findings in the report.

Chapter III - The Market Analysis and Forecast section includes INPUT's analysis of the telecommunications sectors of the Federal Information Technology Budget for fiscal years 1990 through 1995.

This section addresses major market factors, and includes agency forecasts and vendor shares in various market segments.

Chapter IV - The Agency Requirements section provides information about key regulation and policy agencies and on agency plans for acquiring telecommunications systems. The section also includes a discussion of current standards, protocols, and compatibility issues in the federal telecommunications market.

Chapter V - This section discusses the implications of FTS 2000. The section provides a summary of FTS 2000 services and analyzes agency interests and concerns about using FTS 2000.

Chapter VI - The Competitive Trends section provides analysis of the competitive environment in three key telecommunications market segments. This section also identifies the top five market leaders in each segment, and reviews the product mix in major federal contract awards over the past two years.

Chapter VII - The Telecommunications Opportunities section provides an agency-specific compilation of major federal telecommunications procurements scheduled for award in fiscal years 1990 through 1995.

Several appendixes are also provided:

- Interview Profiles
- Definitions
- Glossary of Federal Acronyms
- Policies, Regulations, and Standards
- Related INPUT Reports
- Agency and Vendor Questionnaires

II
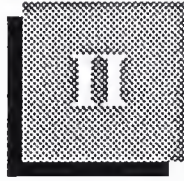
Executive Overview

A
Federal Market Pressures

The federal market for telecommunications products and services is buffeted by two conflicting pressures. Increasing demand for connectivity solutions is exerting a strong positive pressure. The positive pressure is being counteracted by strong negative pressures related primarily to cost. Exhibit II-1 summarizes the key positive and negative pressures.

EXHIBIT II-1

Federal Market Pressures

Connectivity

Positive
Pressures

Messaging

Interoperability

Policy/Regulation

FTS 2000

Budget/Deficit Reduction

Cost

Negative Pressures
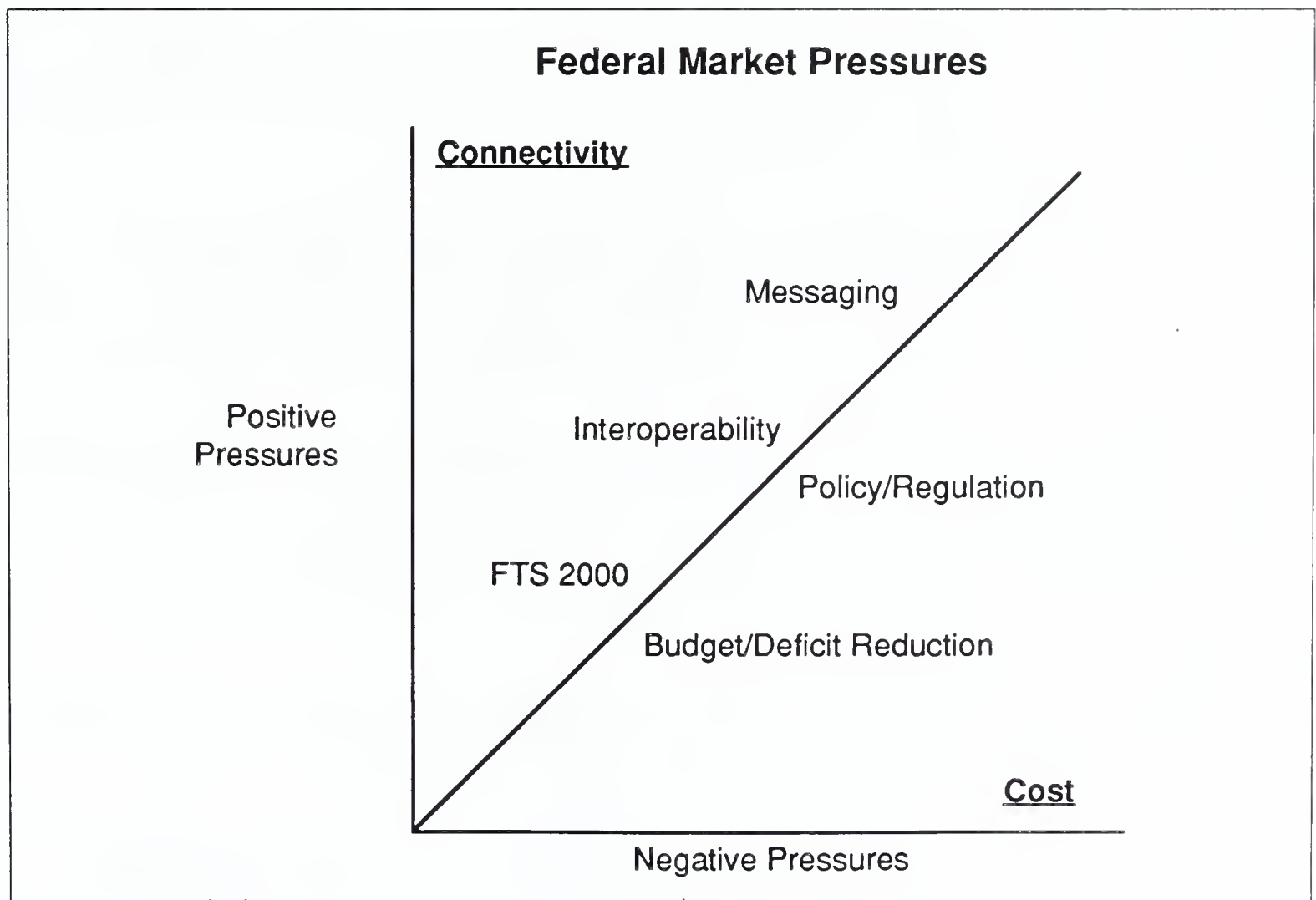
On the positive side, the availability of FTS 2000 represents a strong pressure. Agencies and departments that had been holding plans in abeyance while FTS 2000 was being contracted and implemented are now ready to move forward. While questions remain about data networking costs and capabilities of FTS 2000, plans are moving forward to make use of features and services not previously available.

The ability to interconnect disparate devices and systems is also creating positive pressure. With GOSIP now the agreed-upon standard, agencies are expected to show increasing interest in standardized products and services that will permit the interconnection of networks and systems.

In addition to network-based pressures (FTS 2000) and physical/logical connectivity pressures (interoperability), agencies and departments are increasingly interested in messaging services such E-Mail and EDI that will increase the reliability and speed of communications.

Positive pressures are counteracted by two major forces. The first is the demand for budget/deficit reduction and policies that make connectivity more difficult to achieve.

Budget/deficit reduction considerations will continue to impact an agency's ability to implement modern telecommunications technology. Planners must continue to make compromises between solutions that will provide a base for future growth and needs to meet current requirements with increasingly limited funds.

Policies/regulations that necessitate lengthy acquisition processes can also preclude the implementation of telecommunications technology that provides a base for future growth. In addition, policies that mandate specific standards, such as GOSIP, will exert a negative pressure, since many manufacturers are only beginning to be able to meet the requirements.

Many of the policies and regulations also have a cost impact by delaying productivity gains and necessitating less-than-optimal solutions.

Overall, positive pressures are expected to outweigh the negative pressures, since timely and effective communications are a growing need.

B

Federal Telecommunications Market Segments

This market forecast focuses on several specific types of telecommunications systems and services commercially acquired by the federal government, as shown in Exhibit II-2:

* Leased telecommunications services, including common carrier connections, and local-area and wide-area network services constitute about 69% of telecommunications services procurement.

- Hardware, such as cabling, switching equipment, and satellite ground stations, accounts for about 14% of annual expenditures.

- Professional services, such as network design, installation, and equipment maintenance, represents approximately 10% of outlays.

- Network services, such as value-added (packet-switched) networks, E-Mail, and EDI services, represents approximately 7% of expenditures. Network services also includes access to public data bases to obtain information for analysis.

EXHIBIT II-2

Federal Telecommunications Market Segments

Professional Services

Network Services

7%

10%

Hardware 14%

Leased Telecommunications 69%
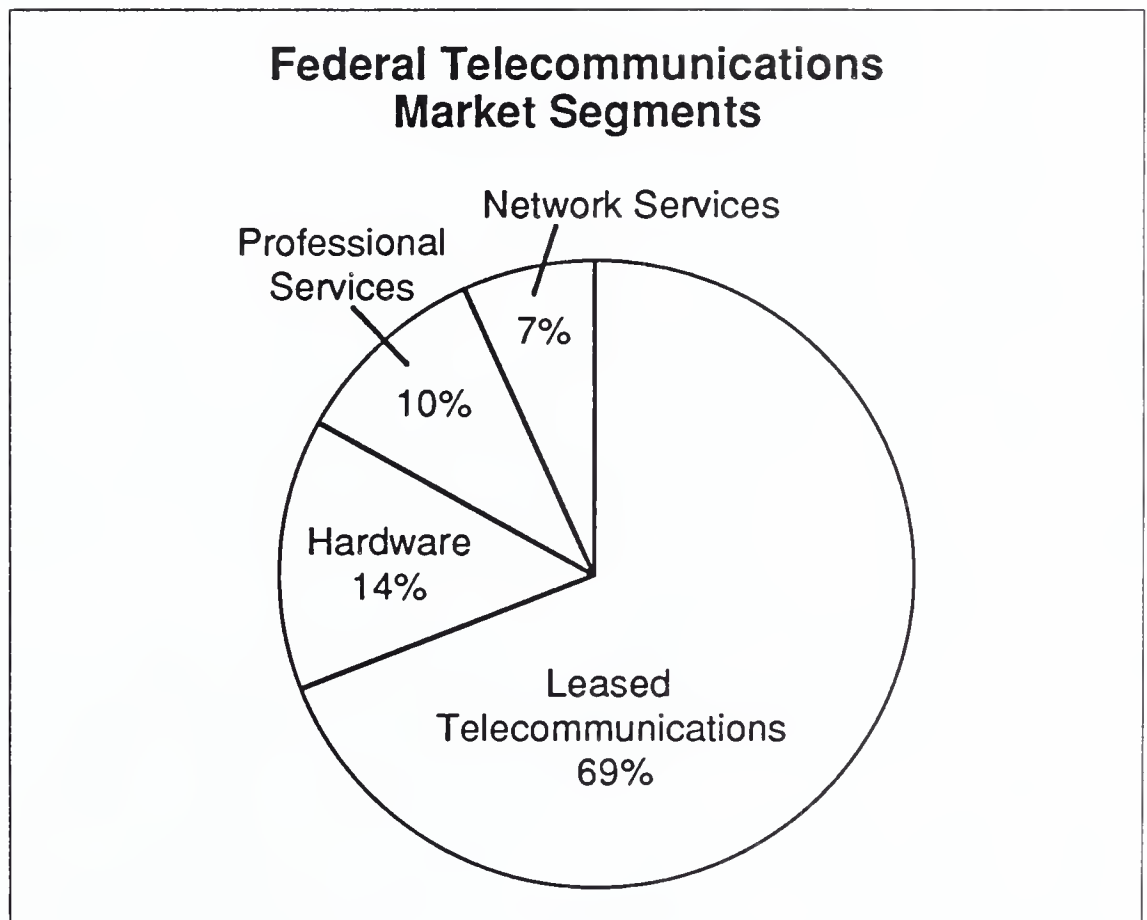
The forecast also includes some telecommunications hardware and services acquired as part of other information technology programs, such as office automation and information systems, distributed data processing, and C2 (Command and Control) and C3 (Command, Control, and Communications) acquisitions.

Local telephone service and the communications components of many intelligence and defense tactical/weapons systems are funded by the government outside of agency information technology budgets and consequently fall outside the scope of this market forecast.

C

Market Environment

The federal telecommunications market is shaped by the procurement activities of the agencies and by a variety of regulatory, policy, and standards influences, as shown in Exhibit II-3.

EXHIBIT II-3

Federal Telecommunications Market Environment

Industry Regulation

Federal Buyers, Suppliers, Users

Federal Policy & Standards

International Standards
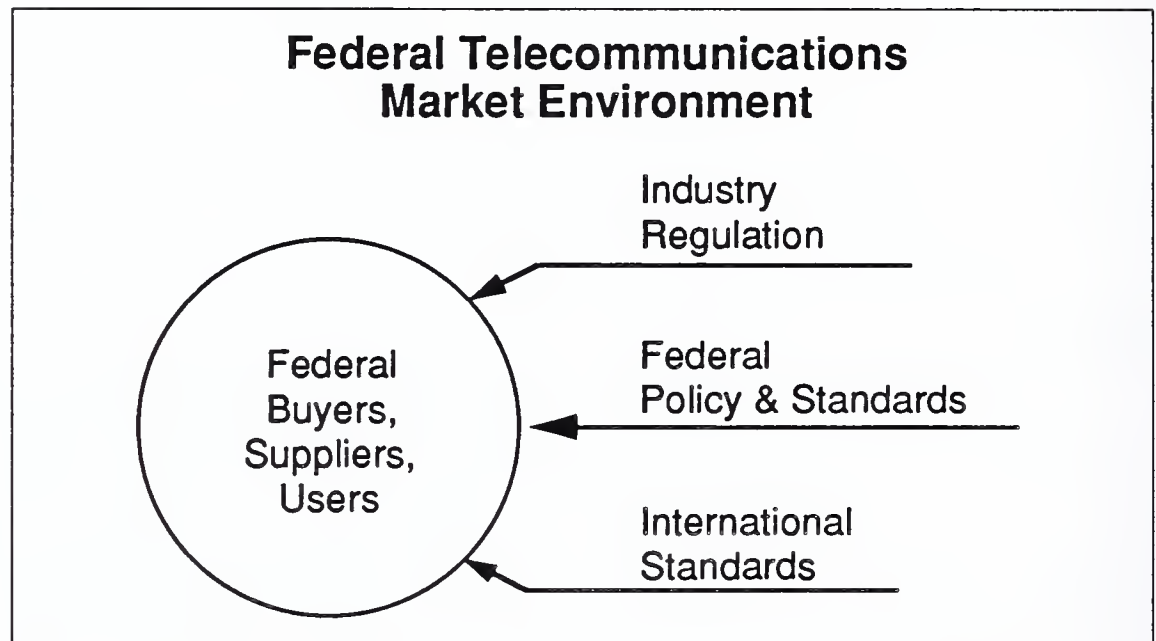
Most federal agencies are both buyers and users of telecommunications systems and services. Several agencies, however, function primarily as buyers or resuppliers of telecommunications resources for other agencies.

- GSA, through the FTS 2000 WITS
- Defense Communications Agency (DCA)
- U.S. Army as executive agency for DoD
- U.S. Air Force and DoD executive agency
- Defense Commercial Communications Office (DECCO)

Other federal agencies influence the market primarily through regulation, policy, and standards activities. These agencies include the FCC, NCS, NTIA, NBS, OMB, and NSA. Since federal telecommunications access extends outside the government and across international boundaries, the market also is subject to external pressures from:

- International organizations such as CCITT, ISO, and the ITU
- National industry organizations such as NATA and ANSI
- PTTs in foreign countries

D

Market Forecast

INPUT estimates that the federal government telecommunications market will increase from $4.2 billion in FY 1990 to $5.9 billion in FY 1995 at an average annual growth rate of 7%, as illustrated in Exhibit II-4.

EXHIBIT II-4

Federal Telecommunications Market Forecast, 1990-1995
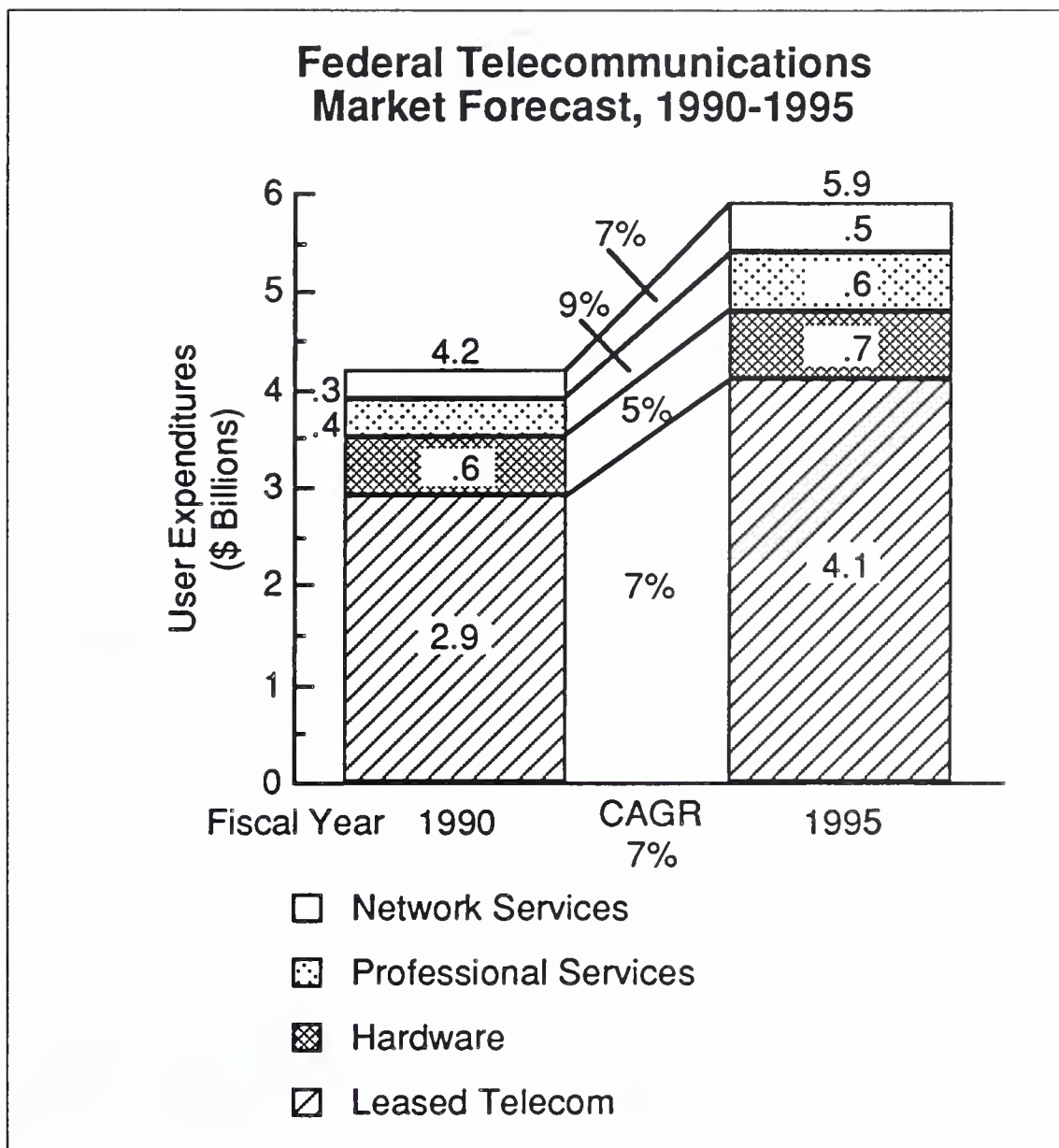
Although the overall market size continues to grow, the growth rate has slowed slightly compared to earlier forecasts. This is due in part to reduced budget allocations in the Defense Department. Unlike virtually every other category tracked by INPUT, telecommunications spending by Defense agencies accounts for more than half of the federal total. Thus, budget cuts resulting from what is commonly called "the peace dividend" have lowered the growth rate of telecommunications.

Spending on network services, although it is still the smallest component of the forecast, has grown considerably. In the past year, several agencies have announced initiatives, many of them documented in INPUT's PAR data base for both value-added networks (VANs) and EDI applications.

Finally, FTS 2000 is exerting conflicting pressures on the federal market. On the one hand, prices (at least for voice services) are projected to be lower, reducing agency costs. Even data transmission rates, initially

high, are being driven down by external competition. On the other hand, the enhanced capabilities of FTS 2000 are beginning to stimulate latent demand among many agencies for new services and features.

Professional services, although representing a small part of the market, will exhibit the highest growth, with a compound annual growth rate of 9%.

E
Technical Trends

As a result of issues related to divestiture, FTS 2000, and an unstable standards environment, many agencies have adopted a wait-and-see attitude about the application of telecommunications technology. However, this is expected to change.

Although issues remain to be resolved, major divestiture issues have been settled. FTS 2000 has been contracted for and the first phase of implementation is complete. And, with adoption of GOSIP, connectivity and interoperability standards are becoming more clear.

With these changes, technology acceptance is beginning to grow. Greater acceptance is expected over the next five years. However, initial focus will be on capabilities such as the integration of voice and data. Agencies are expected to begin the integration process through basic capabilities provided by FTS 2000. This is the same approach taken by the private sector.

Although the private sector may have a greater availability of funds, it is equally cautious about committing to technology that changes quickly and could lock it into a technological approach for an extended period. With extended procurement and life cycles, the federal sector will be equally cautious, giving preference to proven technology and services.

A general lack of staff expertise will cause agencies to increase their emphasis on single sources of supply where possible. This will tend to drive agencies toward use of services such as FTS 2000. Agencies will also be driven toward the use of integrators that are able to deliver complete solutions.

LAN and LAN-to-WAN connectivity is a growing need for agencies, as it is in the public sector. With many basic needs being met through FTS 2000, agencies will place increased emphasis on connecting their large numbers of disparate LANs. LAN interconnection will be accompanied by connection of LANs to wide-area networks such as FTS 2000.

With growing network connectivity, interoperability will be a growing necessity. With a wide range of system standards already in place, agencies are expected to look for services and hardware or software that will permit greater communications between systems.

As in the private sector, ISDN remains an enigma to federal agencies. Agencies recognize the benefits of being able to integrate voice, data, text, and video, but are unable to clearly identify specific services that relate to their needs. Though this should change over the next few years, most agencies continue their wait-and-see approach to ISDN.

Federal agencies are growing more concerned with telecommunications security and are requiring end-to-end encryption even for systems that handle nonsensitive information. Passage of the Computer Security Act has heightened this concern. Exhibit II-5 outlines the expected technical trends.

EXHIBIT II-5

Technical Trends

- Increasing technology acceptance
- Voice/data integration
- Increasing service orientation
- LAN-to WAN-connectivity
- Increased emphasis on interoperability
- ISDN availability
- Increasing security concerns
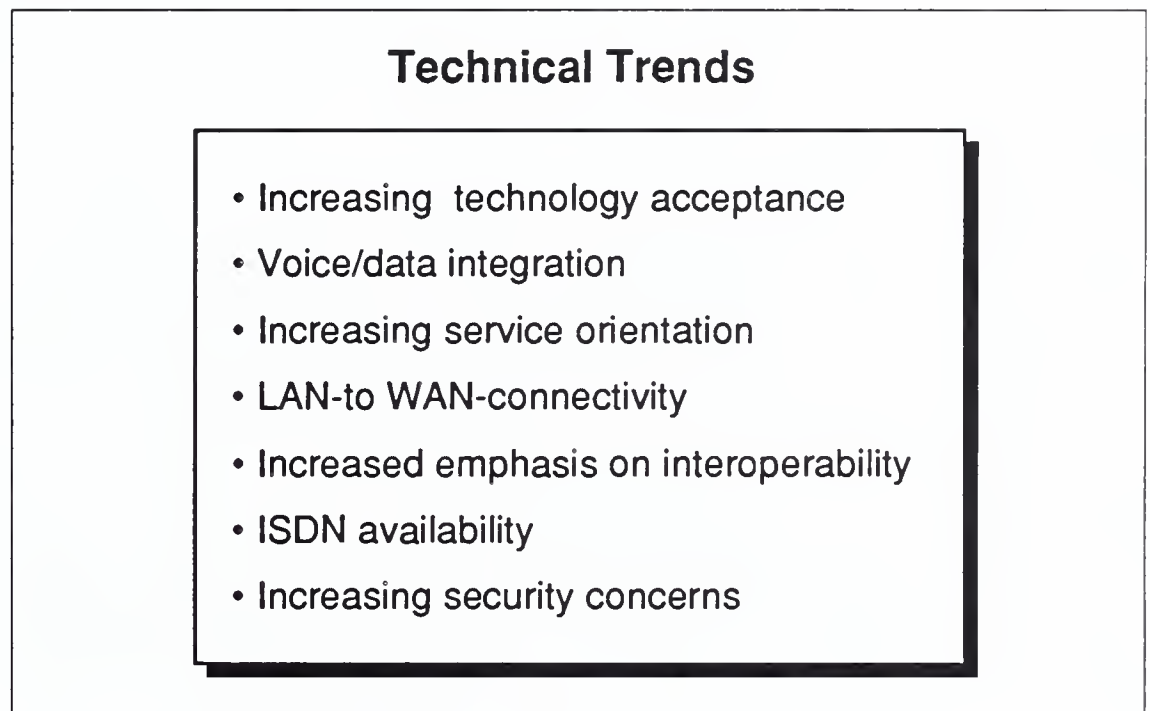
F

Issues and Problems

Federal agencies and private sector organizations experienced similar problems entering the postdivestiture era, as shown in Exhibit II-6. The government encountered more and greater problems since it is the world's single largest customer for commercial telephone service. Although most service problems have now been resolved, several issues remain. A primary issue is the scope of service to be provided by the Regional Bell Operating Companies (RBOCs).

Agencies continue to express concern over the budget impacts of the Gramm-Rudman-Hollings Act. The impact on telecommunications programs may be mitigated, however, by cost trade-offs between actual travel and travel by telecommunications. INPUT has observed that a more common problem is that approved money is not being spent.

EXHIBIT II-6

Agency Problems and Issues

- Local (RBOC) services

- Budget constraints

- Reorganization and staff shortages

- Technological complexity

- Procurement processes and problems

Agencies remain unprepared for the staffing impacts of divestiture and FIRMR-mandated integration of voice and data communications organizations. Agencies believe they cannot compete with the private sector to recruit scarce, highly qualified telecommunications specialists. This problem is not limited to telecommunications areas. It pervades virtually all highly technical areas in the government. However, this problem represents an obvious opportunity for contract service providers.

The need to integrate systems and networks has significantly increased the complexity of systems and networks. Agencies, already constrained by inability to attract a wide range of technical expertise, must increasingly contend with systems and networks that are inter-connected, interoperable, secure, and provide a free flow of data and information.

Bidder protests and congressional investigations have substantially changed the bidding conditions and award schedules. As a result, agencies are increasingly inclined to use approved facilities and services, such as FTS 2000, except in cases where there is an overriding need for separate networks.

G
Leading Agencies

Although all federal agencies buy some commercial telecommunications systems and services directly, the annual procurement by DoD represents a substantial portion of the total telecommunications expenditures.

Most of the major new telecommunications initiatives from FY 1990 through FY 1995 come from DoD and GSA.

- Defense communications will continue their evolution to the new defense switched network (DSN), or the FTS 2000 network. New initiatives will include the WAM program and projects to integrate LANs and connect LANs with WANs.

- On the civilian side of the federal government, GSA will continue its telecommunications initiatives by expanding and enhancing FTS 2000 capabilities. GSA will also be placing greater attention on LAN connectivity requirements, continuing to structure umbrella contracts that provide standardized solutions. Through these network initiatives, GSA expects to be able to provide a significantly enhanced infrastructure from which agencies will be able to meet their needs.

The major federal telecommunications buyers'/suppliers' projects are listed in Exhibit II-7.

Leading Federal Telecommunications Buyers/Suppliers

- Defense
  - DCA ($430 million)
  - WAM
- GSA
  - FTS 2000
  - LAN connectivity

H
Competitive Outlook

Despite divestiture and increased market pressure, AT&T remains the dominant market force. In addition to protecting its existing market share, AT&T has been successful as a team member in several recent network procurements. FTS 2000 is the most notable. However, AT&T is being challenged by a variety of other firms seeking specific market niches in the government.

Aside from the provision of local service, the Regional Bell Operating Companies (RBOCs) may not be a significant force in the federal market during the next several years. Continued constraints of structural separation, which have largely prevented the RBOCs from bidding for major federal procurements, are being challenged in the courts.

However, with the exception of Bell Atlantic, which provides local service through C&P Telephone, the RBOCs will be largely limited to providing service within their own LATA. The exception will be the unregulated portion of the RBOCs which may become increasingly

aggressive in providing niche products and could begin providing gateway services in localized geographic areas. INPUT believes that the provision of gateway services will become increasingly liberalized over the forecast period.

FTS 2000 will be the dominant delivery infrastructure for the next several years. With integration becoming increasingly important, the greatest competition will be for products and services that provide connectivity to FTS 2000. Of these, the greatest needs will be for connectivity solutions to permit LAN and office systems access to FTS 2000.

As competition intensifies, agencies will place increased emphasis on service and support. Organizations that can provide strong support will be in a favorable position to compete for specialized services.

Vendors will need to place increased emphasis on establishing alliances with Sprint and AT&T, the FTS 2000 providers. Although each is a strong organization with broad ranges of products and services, there are additional opportunities to provide specific products and services to meet agencies' needs. Neither organization can meet all requirements of all departments and agencies. However, the situation creates a marketing problem for many vendors.

As independent companies, both AT&T and Sprint are expected to promote solutions based on their own product lines. Both organizations could seek to delay solution decisions until they are able to develop specific products, even though products may be available from other vendors.

The situation places a burden on independent vendors to ensure that federal users are aware of products and services that they can provide. They will need to shift their emphasis from sales to marketing. To be successful, vendors will need to promote visibility of their organization and products with federal users.

The window of opportunity for smaller telecommunications companies will close much more quickly than it did for their counterparts in ADP systems and services. The two-prime-contract approach mandated for FTS 2000 and the increasing preference shown by federal agencies for systems integration vendors could lock out smaller vendors who do not have close ties to established prime vendors in the federal market.

However, many firms and trade associations continue to exert heavy pressure on Congress and GSA to limit the scope of FTS 2000. If their efforts are successful, this could open up more opportunities for other vendors. The competitive outlook is summarized in Exhibit II-8.

EXHIBIT II-8

Competitive Outlook

- AT&T remains dominant
- Niche markets increasingly important
- FTS 2000 alliance necessary
- Increased services/support necessary
- Increasing focus on systems integration

I

Recommendations

All telecommunications vendors need to invest more effort in understanding agency missions and communications requirements. This understanding may be difficult to achieve, yet will be a key factor in successful bids for agencywide telecommunications systems that support more than one mission.

Since the government continues to experience a shortage of telecommunications expertise, vendors can improve their prebid positions by providing education, technology forecasts, and planning guidelines through high-level briefings and meetings with federal officials. This marketing effort, as opposed to selling, is a critical element in enhancing federal presence.

Vendors need to provide total telecommunications solutions, including preimplementation planning and postimplementation service. Agency officials frequently voiced concern over vendors, particularly in the hardware area, that provided inadequate support after installation. As a result, federal buyers are placing increased emphasis on corporate stability and reputation for services.

Vendors must move quickly to establish a viable market presence in federal telecommunications. Though the growth of network services will create opportunities, vendors that have not created visibility of their presence and the value of their products will lose market position.

Finally, those vendors not included in the two FTS 2000 contract teams should continue to seek niche markets on the periphery of the FTS 2000 contracts. They should also work with agencies to try to limit the scope of contracts where possible. Exhibit II-9 lists INPUT's recommendations.

EXHIBIT II-9

II-12

Recommendations

- Understand agency missions and communications requirements

- Increase marketing, reduce sales

- Emphasize total solution, corporate stability, and service

- Move quickly to establish market position and share

- Seek FTS 2000 alliances and exceptions

III
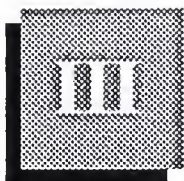
Market Analysis and Forecast

Although the federal telecommunications market has shown signs of increasing volatility, INPUT continues to believe that it will show sustained growth well into the 1990s.

However, though spending will continue to grow, the number of distinct opportunities will probably decrease. Growth in some segments of the market will level off. This will be offset by new growth in other market segments.

This section of the report presents INPUT's forecast for growth of the federal telecommunications market. It analyzes individual market segments, the competitive environment, and the potential effects of federal policy and regulation during the forecast period.

A

Federal Market Forces through 1995

There are a number of forces, listed in Exhibit III-1, that will drive the federal telecommunications market over the next five years. While some areas and agencies will grow fairly slowly, others will experience very sharp growth.

EXHIBIT III-1

Major Federal Telecommunications Market Impacts

- Budget and deficit reduction

- Policy and regulation

- FTS 2000

- Interoperability

- EDI/E-Mail

- Technological advances

- Vendor competition

Despite implementation of the Gramm-Rudman-Hollings Act, INPUT believes that the effects of budget constraints will be mitigated somewhat in the federal telecommunications market. Budget reductions actually may increase federal dependence on telecommunications services. Teleconferencing and electronic message distribution will be emphasized to reduce travel and other costs.

Agency network service contracts typically last seven to ten years and current contracts will not be terminated due to budget constraints. New and replacement network acquisitions, however, may be deferred if agencies can meet their telecommunications requirements through existing federal resources.

Advanced capabilities of FTS 2000 will stimulate increased use of network services. INPUT believes that the relationship between voice and network services could begin to shift over the next five years. Today, voice services represent an estimated 60% of expenditures. Network-based services account for 40%. Near the end of the five-year period, this could begin to reverse.

With the emphasis on networking products and services, interoperability will be an increasing requirement. Hardware and software that support network and system connectivity requirements should be in high demand.

Although it lags behind the explosive commercial growth, federal Electronic Data Interchange (EDI) will still grow sharply. This will drive up telecommunications traffic and network service requirements, reducing

agency personnel requirements. As more computers tie in directly with their federal counterparts, the volume of information exchange will continue to grow.

E-Mail should also grow significantly. As in the private sector, there is a growing need to improve text communications throughout organizations. This is particularly true for geographically dispersed organizations.

Other factors will also drive the federal telecommunications market:

• Agencies will become more demanding and sophisticated in their telecommunications requirements, initiating their own requirements-type contracts for items outside the scope of FTS 2000.

• Technological advances will change the market character. For example, as better network management tools become available, agencies will come to expect the resulting economies and efficiencies.

• Communications security requirements will increase as a result of the Computer Security Act.

• Further, security considerations will restrict interaction between local-area networks in the DoD, at least in the near future.

Overall, with basic needs satisfied through FTS 2000, competition for add-on and support products and services will become increasingly intense. However, vendors that can provide strong support for unique or niche products and services can find a wider range of opportunities than might be expected.

B

Market Forecast

INPUT expects the federal telecommunications market to grow from $4.2 billion in FY 1990 to $5.9 billion in 1995. This represents an average annual growth rate of 7%, as shown in Exhibit III-2.

This market forecast combines several of the commercially defined systems and service modes described in Appendix B. Leased telecommunications include both leased networks and transmission facilities. Network services includes value-added network services such as packet switching, E-Mail, and EDI. Network services also includes the use of data base services. The hardware category includes both communications devices and computer systems that support telecommunications services. The professional services category includes INPUT's five standard elements, which are:

• Consulting
• Education and training
• Programming and analysis

- Operation and maintenance
- Systems integration

EXHIBIT III-2

Federal Telecommunications Market Forecast, FY 1990-1995
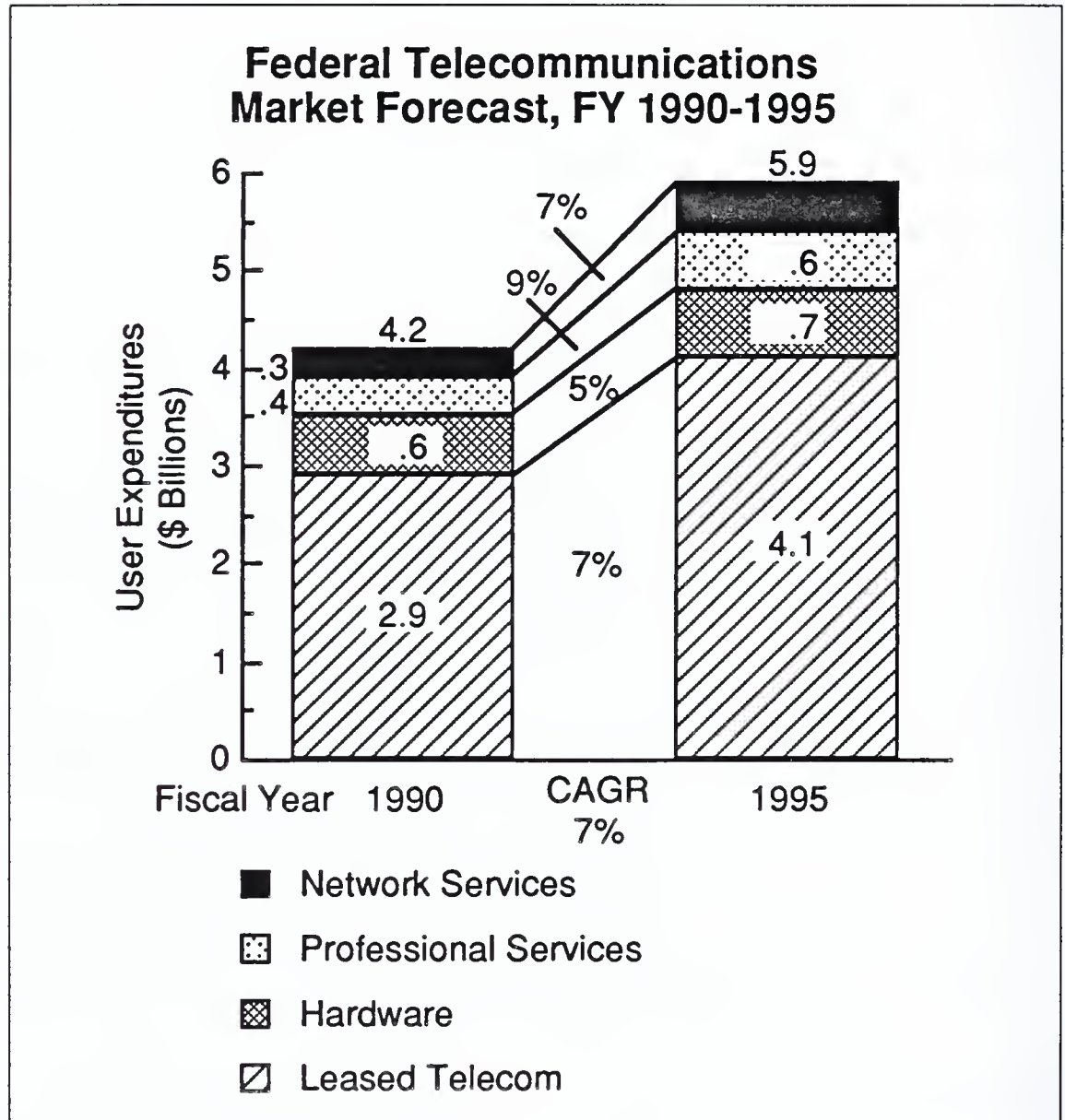
The large percentage of the market attributed to leased telecommunications services (69% in FY 1990 and 1995) tends to obscure some important trends in the smaller segments. Despite an average growth rate near that of the overall federal telecommunications market, the hardware segment exhibits the greatest year-to-year fluctuation, as noted below.

Although a small percentage of the total, professional services exhibits the highest growth rate. This growth is attributable to the growing requirements for professional expertise to develop strategies for integrating increasingly complex networks and systems. This is also discussed below.

INPUT expects the telecommunications equipment market, shown in
Exhibit III-3, to grow at a rate nearly equal to the overall market. However, it is important to note that the 1990 market is considerable higher
than was forecast in INPUT's 1988 report.

EXHIBIT III-3

**Federal Telecommunications
Hardware Market Forecast,
FY 1990-1995**
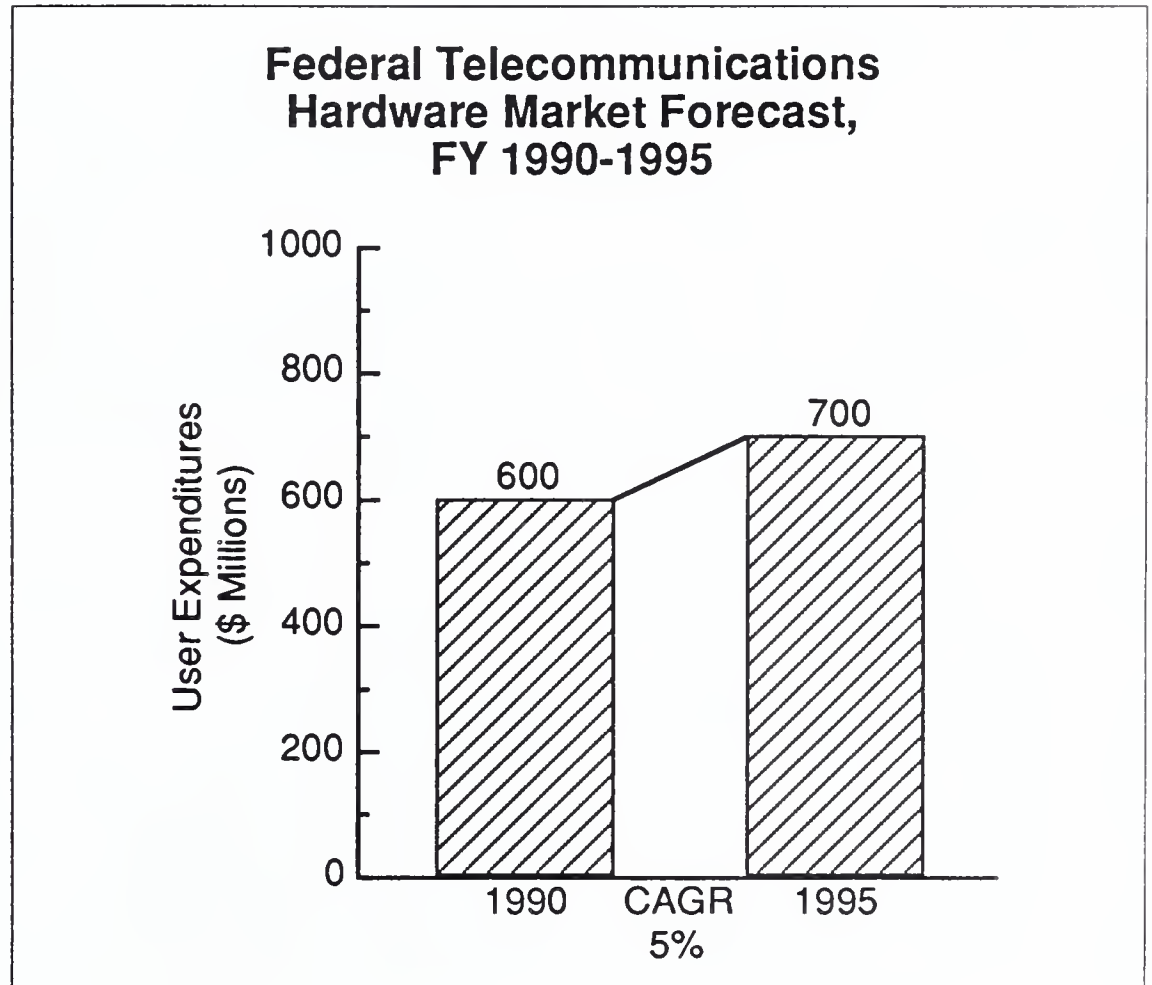
In the previous report, INPUT had forecast a market for telecommunications hardware of approximately $330 million for 1990. Research for this
report shows that the market for 1990 will be closer to $600 million.

There are several factors that account for the underestimation.

• Procurement problems that plagued GSA's regional switch procurements were resolved and new equipment is being acquired at many
locations.

• There has been significant growth in LANs and products to connect
LANs. This is expected to continue.

• With implementation of FTS 2000, networking plans that were being
held in abeyance are now being scheduled for implementation.

Although these and other factors contribute to a significant difference in the size of the 1990 market, INPUT believes that the difference represents a shift in the timing of expenditures rather than significantly increased spending or growth rates. For this reason, the rate of growth has been held at 5%.

INPUT estimates that the professional services segments of the federal telecommunications market will grow from $400 million in FY 1990 to $600 million in FY 1995, a CAGR of 9%. This growth rate is higher than the overall telecommunication growth rate shown in Exhibit III-4.

EXHIBIT III-4

Federal Telecommunications Professional Services Market Forecast, FY 1990-1995
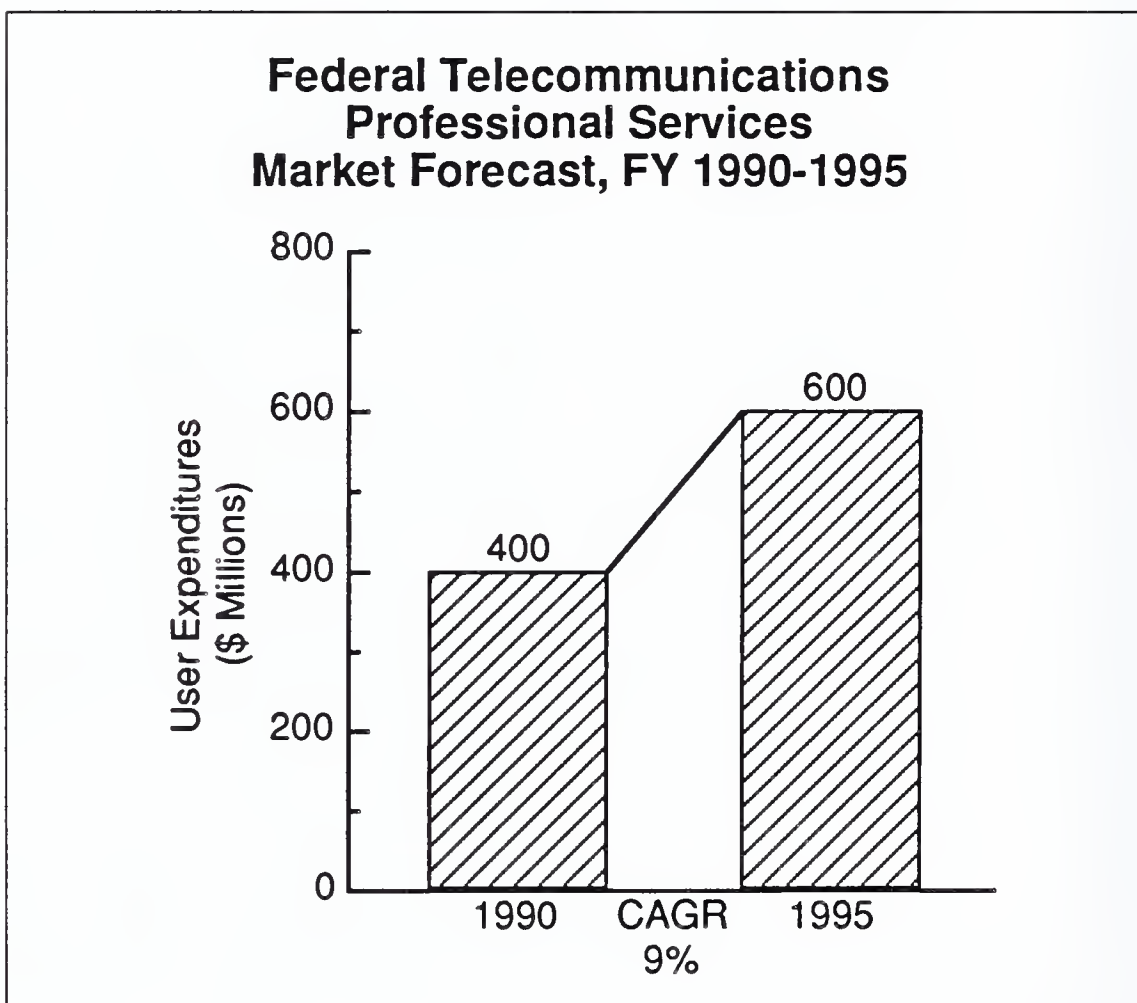
There are several reasons that the growth rate for professional services is higher than the overall average.

- The combined effects of budget constraints on agency staffing and the shortage of in-house telecommunications expertise is expected to continue to contribute to the growth of professional services throughout the forecast period.

- Growth in the FY 1990 through FY 1995 timeframe also will be driven by agency acquisition of maintenance services for recently acquired hardware.

- There is increasing need for assistance to integrate increasingly complex networks and systems.

As in most other information technology areas, agencies are reducing their own technical activities in network planning and management. This is expected to continue, particularly with the assistance of AT&T and Sprint, as FTS 2000 use grows. Agencies are procuring comprehensive solutions to their telecommunications needs.

Exhibit III-5 provides a breakdown of INPUT's traditional delivery mode for professional services. INPUT believes that analysis of these submodes provides a strong indication of the trends and directions of the federal telecommunications market over the next five years. There are several trends that are of particular note.

EXHIBIT III-5

Federal Professional Services
Telecommunications Market
Percent by Submode, 1990-1995

			CAGR (Percent)
Systems Development	Civilian	18 (1990) / 16 (1995)	8
	Defense	19 (1990) / 15 (1995)	7
Systems Integration	Civilian	27 (1990) / 34 (1995)	15
	Defense	30 (1990) / 33 (1995)	14
Systems Operations	Civilian	23 (1990) / 29 (1995)	14
	Defense	35 (1990) / 41 (1995)	15
Design/ Consulting	Civilian	15 (1990) / 10 (1995)	3
	Defense	11 (1990) / 7 (1995)	3
Education/ Training	Civilian	15 (1990) / 11 (1995)	4
	Defense	5 (1990) / 4 (1995)	4

Percent axis: 0, 10, 20, 30, 40, 50

Percent

▨ 1990   ▧ 1995

- For both civilian agencies and the DoD, education and training currently represent only a small percentage of total telecommunications expenditures. This is not likely to change and the proportional share could decline slightly. The growth rate is less than for professional services or for telecommunications as a whole.

- Design/consulting represents a small portion of professional services and has a low growth rate. The rate is half the growth rate for telecommunications and a third of the rate for professional services. The lower rate of growth is understandable. Design and consulting related to individual systems has given way to the complexity of large systems and the integration of systems and networks.

- Systems development is still a small portion of professional services and is expected to remain so. The growth rate is comparable to the rate for professional services, due to the continuing need for new systems. This is not expected to change.

- The greatest needs are for systems integration and systems operations. Both show comparatively strong growth over the five-year period. The growth in these areas is not surprising.

  - With a shortage of qualified staff, both the Defense Department and civilian agencies are increasingly in need of professional services to manage their telecommunications network services. The Defense Department's requirements could be even higher if security requirements were not such a major concern.

  - The strong growth of systems integration is a clear indication of the need for both civilian agencies and the Defense Department to obtain solutions to increasingly complex networking problems. These requirements will grow rather than diminish over time.

  - Although there will continue to be needs for both design/consulting and systems development, data clearly indicates that systems integration is becoming the preferred method of acquiring new systems or making major changes to old systems.

With systems integration representing nearly 30% of the professional services market today and growing at an overall annual rate of 14%, there is strong evidence that solutions that provide connectivity among various networks and systems is a necessity.

C

Agency Forecast

The federal telecommunications market forecast by agency is based on information from long-range plans, OMB A-11 submissions, the FY 1990 and FY 1995 budgets of the United States government, and interviews with agency officials responsible for telecommunications programs.

As shown in Exhibit III-6, INPUT estimates relatively equal growth in defense and civilian agencies' spending, with defense spending representing the greatest proportion.

EXHIBIT III-6

**Federal Telecommunications
Market Forecast for
Defense and Civilian Agency Expenditures
FY 1990-1995**
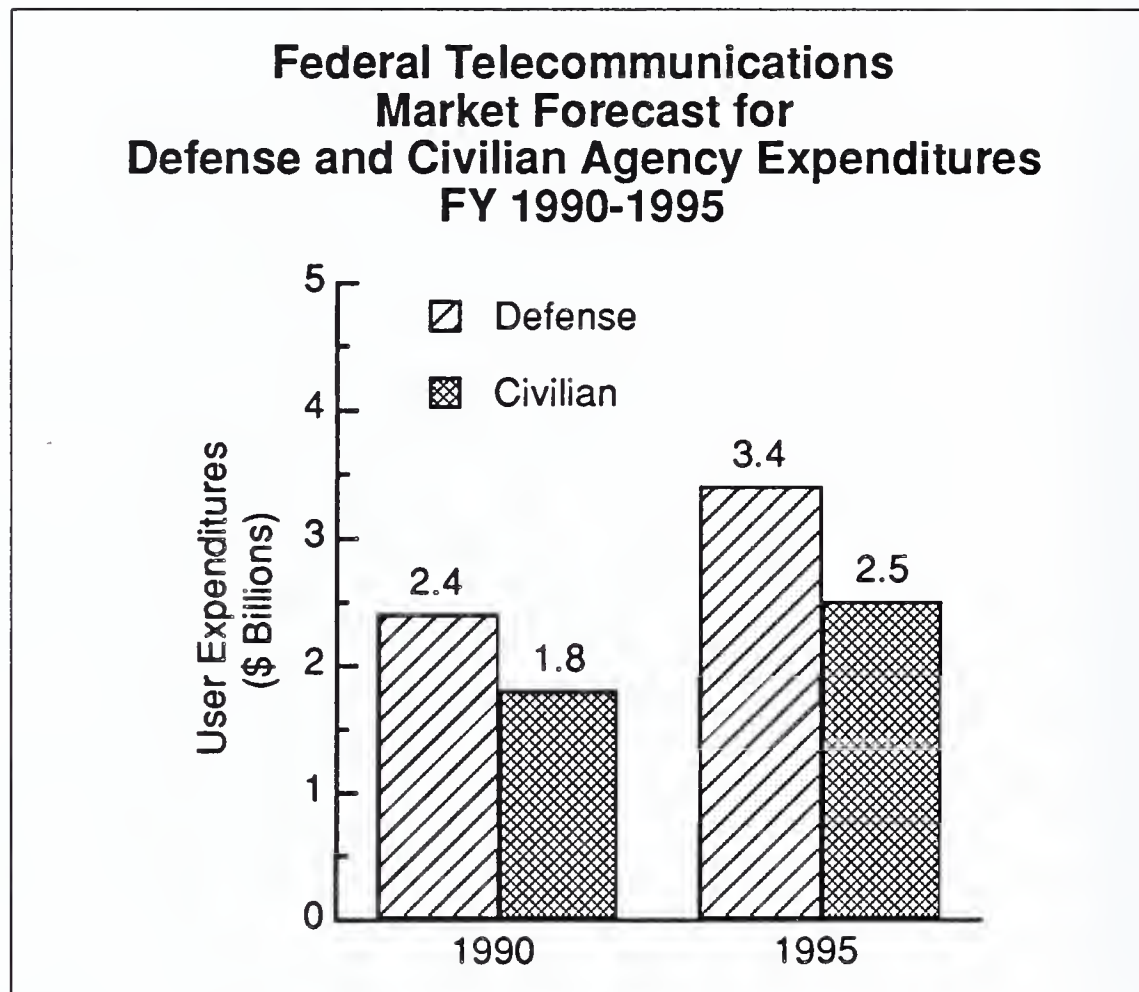
1. Special Defense Considerations

INPUT regards the defense telecommunications forecast as a conservative estimate of the defense market for commercial systems and services. Base or facility communications, which are not acquired through agencywide programs, are usually not identified in agency information technology budget documents. This is particularly evident for telephone switching equipment that is not part of a commandwide acquisition.

Upgrades to base communications systems and local telephone service typically fall below budget reporting thresholds and may be funded through operation and maintenance budgets. Unclassified programs with

a system life cycle cost of over $25 million must be reported by the military departments in response to Congressional Armed Services Committee Directives.

This new reporting limit represents a significant change, equaling the previous one-year limit set for MAISRC review. This reporting requirement will increase visibility of DoD spending. However, it should be noted that a significant amount of defense communications equipment funding is included in weapons programs and strategic systems. This funding is not regarded by DoD as part of the information technology budget.

2. Leased Telecommunications Procurement

Exhibit III-7 shows the current and forecast distribution of leased telecommunications service procurement by agency for major defense and civilian buyers.

Several assumptions about the forecast must be noted for interpretation. Both the Army and the Navy are expected to ranked as top users of FTS 2000 as measured by interagency payments. For this forecast, however, all FTS 2000 expenditures are included in the civilian numbers since GSA ultimately acquires the commercial services to support FTS 2000.

EXHIBIT III-7

Leading Leased Telecommunications Users

Department/ Agency	$ Thousands	
	Fiscal Year 1990	Fiscal Year 1991
Defense		
OSD; Other DoD Agencies	1,395,243	1,433,127
Army	229,364	225,499
Navy	152,135	160,670
Air Force	138,455	160,770
U.S. Marine Corps	4,472	4,480
Civilian		
GSA	410,038	439,783
Treasury	215,284	228,815
Agriculture	106,987	113,591
NASA	85,290	110,467
Health and Human Services	84,536	96,872
Energy	68,886	63,518
Veterans Affairs	60,811	60,779
Justice	54,797	62,269
Transportation	30,026	32,238
State	27,920	31,212
EPA	27,427	29,797
Interior	23,854	22,186
Commerce	23,055	33,444

Source: FY 1991 Agency Submissions to OMB *Circular A-11,43A*

D

Vendor Market Share and Competition

The current list of potential suppliers of telecommunications systems and services to the federal government has grown to nearly 3,000 companies. However, INPUT believes that the actual number of direct suppliers will diminish, under the pressure of intense competition for the federal dollar.

Reductions will result from two key factors:

- GSA and agencies are placing increasing emphasis on the provision of solutions, rather than specific products. With this emphasis, there will be a reduction in the number of vendors that provide only specific hardware.

- A high percentage of service requirements will be met through FTS 2000. As a result, products and services that relate to FTS 2000 will frequently be provided as a subcontract to either AT&T or Sprint. Previously, the same products or services might have been provided directly. Products and services will more frequently be provided as part of systems integration contracts.

Smaller companies, including most startups, will be unable to maintain a strong federal market presence because of the size and capital-intensive nature of federal telecommunications programs. Federal agencies will continue to show preference for larger, established federal vendors acting as prime contractors or systems engineering and technical assistance (SETA) contractors.

Although it has been somewhat reduced by the requirements of the FTS 2000 contract, AT&T's dominance of the federal telecommunications market will continue. Although it holds a dominant position, AT&T remains vulnerable in several specific market segments. Companies such as Contel, Rolm, and Northern Telecom will continue to make inroads in the hardware market segment. Others will find success in niche segments, where a specific product or service is needed. In addition, AT&T revenues will increasingly include revenues that will be passed through to subcontractors.

INPUT expects systems integrators, experienced in the federal marketplace, to gain most in the federal telecommunications market. Agencywide network integration projects and other network procurements are likely to be suited to the expertise of systems integrators.

INPUT believes that traditional value-added network (VAN) vendors will be hard-pressed to expand their share of the market in the next few years. The distinction between VAN and common-carrier services is becoming blurred as traditional long-haul communications carriers add features previously available only from VANs. In addition, federal networks such as FTS 2000 and department- or agency-specific networks will offer services that compete directly with VANs.

E

Technological Impacts

As shown in Exhibit III-8, agencies and vendors generally agree about the types of new technologies that will affect federal telecommunications planning and acquisition in the 1990-1995 timeframe.

EXHIBIT III-8

Technology Impact on Federal Telecommunications

Technology	Importance to*	
	Agency	Vendor
Local-Area Networks	High	High
Network Management Systems	High	High
Electronic Mail	High	High
Electronic Data Interchange	High	Average
Value-Added Networks	Average	Low
Satellite Networks	Low	Low
VSAT Networks	Low	Low
ISDN	Low	Average
Cellular Telephones	Low	Low

*Vendor importance based on ranking, agency importance based on ratings.

Emerging telecommunications technologies will play a major role in the federal market in the 1990s. Agencies and vendors generally agree on the timetable for these technologies, but their reasons differ.

Agencies want to avoid risk and stay a comfortable distance behind the leading edge of technology. Vendors believe that telecommunications technology is moving in advance of user requirements in the federal and private sectors, with the lag in the federal sector due to longer system life and procurement cycles.

Some federal agencies may be forced to adopt new telecommunications technology earlier in the 1990s. Agencies investing in supercomputer technology to meet high-volume data and computational requirements will encounter communications bottlenecks. Agencies with dispersed facilities in remote areas cannot meet emerging communications require-

ments through land-line carriers alone and are seeking alternative technologies.

INPUT's analysis indicates clearly that internetwork connectivity and services are of higher priority than having the latest technology.

F
Policy and Regulatory Prospects

Federal Information Resource Management Regulations (FIRMR) have been in effect for several years as the primary source of guidance for agency acquisition, management, and use of ADP and telecommunications systems. However, frequent changes in the FIRMRs have continued to complicate things. The merging of agency ADP and telecommunications functions has been slow and continues to be problematic.

Voice and data communications organizations in most agencies have been merged into the Office of Information Resource Management (OIRM) only recently. But confusion about roles and responsibilities continues. Voice and data communications organizations typically address communications problems differently, making it difficult to achieve economies through personnel reductions. Along with the organizational changes, budget planning and reporting are changing slowly to incorporate both voice and data communications program funding in agency information technology budgets.

Most federal agencies appear to be ready to implement systems under GOSIP—the Government Open Systems Interconnect Profile. GOSIP is a subset of the International Open Systems Interconnect Communication standards. GOSIP will support interoperability and data exchange among different federal computer systems and communications networks. As of 1990, GOSIP is a requirement for new telecommunications systems and services. Agencies will use GOSIP to integrate their multivendor networks and systems.

In DoD, vendors face a potential dilemma. On the one hand, DoD has specified GOSIP as a mandatory standard, beginning in 1990. However, several DoD agencies are showing reluctance to abandon the Transmission Control Protocol/Internet Protocol (TCP/IP) standard.

Therefore, over the next few years, DoD will procure systems with both GOSIP and TCP/IP. Further, it is certainly possible that even after 1990, TCP/IP will still be used. Communications vendors, therefore, must show a willingness to adapt to changing government requirements. Requirement for the dual standard is evidenced by a recent Air Force contract to provide network interfaces that support both GOSIP and TCP/IP standards. The Air Force, unable to determine which standard to follow, decided that only a dual-standard approach would provide suitable connectivity.

Congress has already passed several measures to increase agency awareness and formulate computer security policy. The Electronic Communications Privacy Act (Public Law 100-235) requires agencies and vendors to provide end-to-end security and effective encryption for federal telecommunications systems. Among other things, the law specifically addresses the special requirements for protection of computer systems. GSA issued guidelines for implementing the Act.

The National Institute for Standards and Technology will monitor and control the computer security program. The National Security Agency will use its expertise to develop communication encryption techniques. There are several levels of computer security to be executed under the legislation. The first actions to be taken are administrative and physical security measures, such as locked storage in computer facilities. Later phases involve the advancement of new computer systems with built-in security systems.

As is any other consumer, the federal government is subject to regulatory actions taken as a result of the ongoing FCC Computer Inquiry III.

- Considering recent interpretations and court actions based on the Modified Final Judgement (MFJ), INPUT regards as unlikely the relaxation of the structural separation requirements in the near future.

- Federal agencies must recognize regulatory restrictions and competitive needs in contracting requirements when formulating acquisition plans.

- Given the long-term uncertainties of the regulatory climate, agencies must be prepared to modify acquisition plans with little or no advance notice in response to regulatory or tariff changes.

G
Conclusions

The long system life cycles for federal telecommunications systems will continue to provide a steady revenue stream for incumbent vendors. Further, incumbents will continue to capitalize on extension and expansion opportunities in existing contracts. These include minor hardware and software additions for existing contracts.

As with other federal market segments, INPUT expects fewer but larger contracts. In addition to FTS 2000, system engineering and technical assistance (SETA) will become more common for new or replacement systems. The continuing shortage of in-house technicians will also increase opportunities for telecommunications hardware maintenance and consulting, particularly for high-technology systems.

The federal telecommunications market does present some substantial risks. Most funding will continue to be concentrated in a relatively few,

large, network procurements. In recent contract awards, agencies have shown a preference for acquiring telecommunications service (directly or indirectly) through systems houses instead of larger established carriers. Also, budget constraints in other federal information technology market segments will foster competition for the more certain funding allocated to telecommunications programs.

Prevalent agency perceptions of the postdivestiture telecommunications market could cause additional difficulties for vendors. Since agencies meet telecommunications requirements primarily through the acquisition of services, the underlying technology—and any associated risk—should be borne by the vendor. This risk placement is applicable to other market segments as well. If agency requirements are satisfied through teaming or subcontracts, the prime contractor must assume total responsibility for quality and availability of service.

Overall, though the federal telecommunications market has consolidated, and will continue to do so, there are attractive opportunities. Vendors that emphasize support and service will be more readily accepted. Vendors with products and services that support interconnection and interoperability will find a growing market. In addition, vendors that establish strong alliances with major network and systems integrators can find significant growth opportunities.

IV
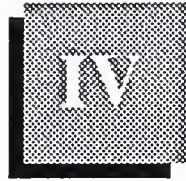
Agency Requirements

As part of its research effort, INPUT interviewed federal officials responsible for agency telecommunications policy, planning, acquisition, management, and use. The views of users and key policy-making agencies, listed in Exhibit IV-1, and the requirements of major user agencies are presented in the following sections of this report.

A
Key Players in Regulations, Standards, and Policy

Although the agencies described below are not major telecommunications users, their activities help to mold individual user agency telecommunications policy and plans.

EXHIBIT IV-1

Key Federal Agencies in Regulations, Standards, and Policy

- Federal Communications Commission (FCC)

- National Telecommunications and Information Administration (NTIA)

- National Communications System (NCS)

- National Institute for Standards and Technology (NIST)

- National Security Agency (NSA)

- Office of Management and Budget (OMB)

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1. Federal Communications Commission

The Federal Communications Commission (FCC) was established by the Federal Communications Act of 1934. Its mission includes regulation of interstate and international communications, scientific and technical support, and long-range policy and analysis. The FCC shares communications oversight with two other agencies.

- The FCC and the National Telecommunications and Information Administration (NTIA) jointly manage radio frequency assignment. NTIA has responsibility for federal radio frequencies; the FCC is responsible for the private sector.

- In times of national emergency, many of the responsibilities of the FCC transfer to the National Communications System (NCS).

The FCC affects the future of the federal telecommunications market through the continuing examination of deregulation (Computer Inquiry III) and of the effects and conditions of the AT&T divestiture.

The Inquiry III proceedings have led to the establishment of nine points for Comparatively Efficient Interconnects (CEI). These points aim to promote standardization interfaces and common end-user access enhancement.

The FCC has in the past participated in CCITT study groups to define ISDN standards. The FCC focuses on the standards that govern interfaces. The FCC also interacts with both domestic and international telecommunications organizations on spectrum management and interference.

2. National Telecommunications and Information Administration

The National Telecommunications and Information Administration (NTIA) was established as part of the Commerce Department in 1987 through a reorganization of the Office of Telecommunications Policy in the Executive Office of the President and Commerce's existing Office of Telecommunications. NTIA serves as one of the President's principal advisors on telecommunications and information issues and provides assistance to other federal agencies in the areas of telecommunications planning, design, maintenance, and overall improvement.

NTIA sets federal telecommunications policy in three areas:

- Policies for which the government conducts its activities within the federal agencies

- Policies for industry and coordination of overlap between industry and federal agencies

- Policies for ISDN standards definition; working with the FCC and CCITT study groups

NTIA receives most of its sponsorship from DoD and in particular the Army, DCA, and NCS. The NTIA also assists with maintaining a central point of contact for the DDN, thus assuring emergency preparedness.

There is ongoing cooperative work with NCS to develop federal modem and data encryption standards, including FED-STDs equivalent to the CCITT V.22bis, V.26, V.26vis, and V.32 standards, and FED-STDs 1028 and 1029 for the application of DES to facsimile and digitized voice transmission. NTIA is not a decision-making body, but serves as a principal voice for the executive branch in domestic telecommunications policy that affects technical and economic advancement.

3. National Communications System

The National Communications System (NCS) and the Federal Telecommunications Standards Program were established in 1972. In addition to its national emergency role in telecommunications, NCS develops the Federal Telecommunications Standards (FED-STDs), which are issued subsequently by GSA.

Ongoing NCS standards activities focus on two areas of concern to federal agencies:

- Interoperability of computer and communications systems

- Development of ISDN standards with CCITT

4. National Institute for Standards and Technology

The National Institute for Standards and Technology (NIST), formerly the National Bureau of Standards, is part of the Department of Commerce. A primary function of NIST is to develop and issue the Federal Information Processing Standards (FIPS) under the provisions of Public Law 89-306 (the Brooks Act). Much of the actual development of the FIPS is done by the National Computer Systems Laboratory at NIST.

In response to the merging of communications and computer technology, standards development at NIST has increasingly involved joint efforts with NCS, such as the federal X.25 standard (FIPS 100, FED-STD 1041). NIST also works with DoD to develop MIL SPEC equivalents to the FIPS.

NIST has been concentrating on the development of federal standards compatible with CCITT OSI recommendations. Despite a clear preference on the part of NIST officials for OSI standards, NIST cannot mandate federal agencies' compliance. Federal policy in such matters must be set by OMB and enforced by GSA.

NIST sponsors a number of vendor programs to promote commercial development and implementation of OSI-compatible systems. It holds OSI workshops, which are very successful. They are held four to five times a year, with over 150 individuals in attendance at each. MAP/TOP demonstrations that use communications protocols based on OSI standards (FIPS 107, IEEE 802.2 and 802.3) are organized by various special interest groups (SIGs). OSINET, a packet-switched network for development and testing of OSI products, is complete and on-line.

Since 1986, NIST has been working with DCA to define OSI standards for DoD. The timeframe for implementation of these standards is not fixed. NIST estimates at least a five-year effort to transfer from current DoD standards such as TCP/IP to OSI. NIST is also completing the software for an electronic mail protocol in conjunction with the DCS for the ARPANET network.

At the request of the Department of Defense, NIST has established an accreditation program for private laboratories prepared to test the computer industry's implementation of numerous Defense Department telecommunications protocols. The program will accredit labs capable of performing tests in accordance with methods designated by the institute. NIST will certify laboratories that can provide testing for three DoD protocols in particular: The Defense Data Network (DDN) X.25 link, the five DoD packet-switching high-level protocols, and the Autodin Mode protocol.

5. National Security Agency

Under National Security Directive 145, the National Security Agency (NSA) was given responsibility for governmentwide communications security. However, as previously stated, NIST has primary responsibility for implementing the Computer Security Act. At the time of this report, the division of responsibilities between NIST and NSA is being investigated by Congress. Specific information about NSA activities is available only to cleared individuals and corporations.

NSA continues to seek vendor cooperation in the applications of government cryptographic methods to commercial systems through the Commercial Comsec Endorsement Program (CCEP). NSA programs to certify trusted computer systems will influence the development of DoD communications systems such as DSN. DoD plans include the use of trusted software in programmable communications equipment such as digital switches. However, the time and expense associated with NSA certifications is discouraging many vendors.

6. Office of Management and Budget

The Office of Management and Budget (OMB) has taken a very active interest in the regulatory aspects of the telecommunications market and in federal agency plans for telecommunications systems.

At one time, OMB was reported to be opposed to the structure of GSA's FTS 2000 initiative. The reports have stopped, but OMB has not clearly dismissed its concerns about some of the assumptions and projected benefits of the initiative. However, congressional pressure to implement FTS 2000 has largely eliminated OMB's reservations.

Under circular A-130, OMB will "...serve as the President's principal advisor on procurement and management of federal telecommunications systems."

OMB has increased its monitoring of sole-source telecommunications procurements, some of which may be represented by the agencies as a continuation of existing (predivestiture) contracts. OMB foresees potential legal problems for the government if such procurements are permitted in a newly competitive market subject to CICA and public scrutiny.

B
Agency Plans

Based on the research for this report, INPUT developed a listing of leading users of leased telecommunications services as reflected in the agency FY90 and FY91 A-11 submissions to the Office of Management and Budget. Major users and their requested funding are shown in Exhibit IV-2. (A detailed listing of major projects and their requested funding is given in Appendix B).

EXHIBIT IV-2

Leading Leased Telecommunications Users

Department/ Agency	$ Thousands	
	Fiscal Year 1990	Fiscal Year 1991
<u>Defense</u>		
OSD; Other DoD Agencies	1,395,243	1,433,127
Army	229,364	225,499
Navy	152,135	160,670
Air Force	138,455	160,770
U.S. Marine Corps	4,472	4,480
<u>Civilian</u>		
GSA	410,038	439,783
Treasury	215,284	228,815
Agriculture	106,987	113,591
NASA	85,290	110,467
Health and Human Services	84,536	96,872
Energy	68,886	63,518
Veterans Affairs	60,811	60,779
Justice	54,797	62,269
Transportation	30,026	32,238
State	27,920	31,212
EPA	27,427	29,797
Interior	23,854	22,186
Commerce	23,055	33,444

Source: FY 1991 Agency Submissions to OMB *Circular A-11, 43A*

The following sections highlight a number of agency projects for new or expanded telecommunications systems and services, and summarize agency requirements. The projects described in these sections are representative of the complexity of federal telecommunications initiatives. They also indicate the increasing complexity of networking within federal departments and agencies. Individual telecommunications programs are listed by agency in Chapter VII of the report.

1. Defense

One of the most aggressive projects of the Defense Department is an upgrade to the World Wide Military Command and Control System (WWMCCS). Initiated in the early 1980s, the project has been plagued by problems of definition, standards, and procurement methodology.

WWMCCS is a DoD-wide network composed of warning sensors, 60 digital computer systems and telecommunications equipment used by the National Command Authority, the Joint Chiefs, and the Commanders in Chief of the unified and specified commands. The system is used to control U.S. military forces throughout the world.

The WAM (WWMCCS ADP Modernization) is a joint effort to modernize WWMCCS. Each branch of the military has its own WAM program to contribute to the project. All branches report to the joint WAM office at the Defense Communications Agency. This program was previously named WIS.

The original WIS program was to be implemented in three phases. The first phase (begun in 1983) was to provide LAN equipment and extensive systems integration. Following initial implementation efforts, the systems did not conform to new DCA standards and work was halted. Continued progress and completion of this phase is questionable, at least as originally defined.

Now that WIS has been replaced with WAM, the Joint WAM Program Office has decided to scrap specific components in favor of less structured procurement methods. Future acquisitions include a Joint Operations Planning and Execution System (JOPES), along with various LAN and AMH (Automated Message Handler) enhancements.

The project is highly complex and is representative of the focus of federal departments and agencies on integrating previously disparate systems. Although the project will continue, no specific schedule has been established.

The TEMPO system is another example of projects directed toward integration. The Defense Department's Telecommunications Modernization Program (TEMPO) is a project to acquire a complete digital voice

administrative telecommunications system to serve 300 DoD activities at 250 locations within the Washington D.C. area.

To date, the DoD has contracted with several vendors to assist in analysis of needs and requirements and development of specifications. When complete, the system will be entirely independent of the FTS 2000 network, but will provide interface to GSA's governmentwide network. The TEMPO system will replace the existing Centrex system.

To date, no awards have been made. RFPs have been received and decisions are expected in the third quarter of 1990.

As with the civilian side of the government, local-area networks are growing in importance in the military. The Navy Department's pending LAN acquisition contract will be an umbrella under which Navy organizations can acquire LANs to meet their local needs. Civilian agencies will also be able to acquire LANs under the contract. As evidence of the need for local-area networking, the vendor will be called upon to supply up to 300 LANs per month for the duration of the contract.

Other examples of DoD's focus on upgrading facilities are the Army's Continental Telephone Modernization program (CTMP) and Army's Corps of Engineers' (COE) worldwide network program. The CTMP program will result in the upgrade of telephone systems at 42 sites throughout the continental U.S. The Corps of Engineers' network program will result in the linking of COE sites throughout the world.

The NETS (National Emergency Telecommunications Service) program is another example of the DoD's need for integrated network services. When complete, the NETS network will provide senior government officials with a surviving communications network capable of accessing any public telephone system in case of a national disaster or emergency.

NETS has been described as a software-intensive series of super switches capable of seeking out the best communications route over multiple networks. Because of its complexity, systems integrators or an independent authority are believed to be the most qualified prime contractors.

DoD continues to voice concern over the issue of computer security. The Computer Security Act of 1987 has heightened this concern. Programs are not being delayed to accommodate security measures, but future telecommunications opportunities related to computer security are foreseeable, including:

- Encryption of long-distance data is needed to make the computer systems secure

- Program development and implementation of new software for secure systems that will not impact performance levels

- Assistance in developing Computer Security Plans for submission to NIST

Security concerns and an ability to meet high criticality requirements contributed to the Defense Department's initial resistance to use of FTS 2000 to meet DoD needs. At this writing, security concerns associated with FTS 2000 continue.

Although work progresses in implementing digital networks to meet increasingly mission-critical requirements, high-level discussions have led to agreements to use FTS 2000 to meet at least part of the department's requirements.

The Defense Department and GSA have agreed to a phased approach to using FTS 2000.

- Initial focus will be on the department's use of FTS 2000 for nonsecure, direct dialing, WATS, and 800 services.

- Following the initial application of FTS 2000, the Defense Department will use FTS 2000 to meet nonsecure data transmission needs.

  - The Defense Department will not use FTS 2000 for communications requiring security.

  - Some time will be required for the Defense Department to identify secure and nonsecure data network needs, since they are currently integrated into the same networks.

- By agreement with GSA, the Defense Department's Defense Commercial Communications Organization (DECCO) will be the primary point of interface for the acquisition of FTS 2000 services.

Pending projects and funding requests clearly indicate the Defense Department's commitment to using telecommunications technology.

2. GSA

For the past two years, GSA's attention has been directed toward FTS 2000. Although there are other projects, the importance of FTS 2000 as a basic infrastructure is sufficiently great to require nearly all of GSA's attention. However, there are other projects that are important to the government and the public. Key ongoing initiatives are summarized in Exhibit IV-3.

EXHIBIT IV-3

GSA Telecommunications Initiatives

- FTS 2000 (network development)
- Aggregated Switch Procurement (ASP)
- Acquisition Automation Program (formerly FACNET)

The Aggregated Switch Procurement (ASP) program is an umbrella contract for the acquisition of digital switches to meet local service requirements throughout the U.S. The procurement provides for the acquisition of voice/data switches by federal facilities in ten regions of the country. Agencies will acquire equipment as funding is available and requirements are justified. The new switches will provide for up to 150,000 lines for local services and interconnection with FTS 2000.

GSA's Acquisition Automation Program—formerly called Federal Acquisition Network (FACNET)—is indicative of the government's trend toward greater interaction with the public through on-line services.

Currently still in a conceptual stage, the network will provide vendors with procurement information through on-line access. Information such as potential solicitations, *Commerce Business Daily* entries, Federal Acquisition Regulations, and other planning information would be available through this on-line service.

Although no specific dates have been established for this procurement, ongoing requirements analysis suggests that services such as EDI might be included.

During the five-year forecast period, GSA is expected to continue to expand the use of FTS 2000. In addition, INPUT believes that increased

emphasis will be placed on enhancing internetworking capabilities and implementing services such as E-Mail and EDI.

3. Department of Energy

The Department of Energy (DOE), in addition to being one of the largest civil users of commercial telecommunications service, relies heavily on contractor support to meet telecommunications requirements. The support includes planning, implementation, operations, and maintenance of telecommunications facilities and services.

To support a need for high-speed, high-capacity networking requirements, the Department of Energy, through the Livermore National Laboratory, became one of the country's largest users of ISDN services. To meet current and growing needs, the Lab has converted more than 10,000 users in 600 buildings from their previous Centrex service to ISDN lines. Though this places additional responsibility on the Laboratory's staff, the Lab expects to save money during the first year.

4. Department of Agriculture

Until recently, the Department of Agriculture's (USDA) data communications requirements were met largely by a department network (DEPNET). The department had plans to expand DEPNET, but has decided to use FTS 2000 rather than recompeting DEPNET services.

However, USDA needs to provide telecommunications service to more than 16,000 field offices throughout the country, many of which are not serviced by FTS 2000. To meet these needs, USDA initiated a procurement for services that are outside FTS 2000. USDA has contracted with U.S. Sprint (Telenet) to provide networking services.

A more recent project plan of USDA is the Integrated Systems Acquisition Project (ISAP). This network will be provided for the Animal & Plant Health Inspection Service (APHIS) of the USDA. The ISAP project will provide for a nationwide, integrated network serving up to 8,000 users at over 1,200 sites. The network will include LANs and WANs, along with a mix of microcomputers, minicomputers, software, and support services. A formal RFP for this network is expected by late summer.

The USDA's projects and plans are another indication of the importance of integrating office and national networking capabilities.

5. State Department

To meet growing needs for integrated, international network services, the State Department requested proposals for the provision of a new international network service to serve 275 international locations.

Replacing an existing point-to-point network, DOSTN (Department of State Telecommunications Network) will provide packet-switched data and voice services. The RFP will also provide options for secure video conferencing. The DOSTN is separate from FTS 2000, but will interconnect as required.

6. Preferred Acquisition Methods

With only a few exceptions, agencies have centralized planning and acquisition of telecommunications services within the OIRM. Although separate voice and data communications offices exist in approximately 50% of the agencies, integration of these offices is imminent.

Agencies prefer to meet their telecommunications requirements in a variety of ways, as shown in Exhibit IV-4, many using more than one source of supply. Acquisition of integrated systems is the preferred method of acquiring services; however, for the majority of agencies this approach will only be used for acquiring agency-specific networks and services.

EXHIBIT IV-4

Preferred Method for Acquiring New or Improved Telecommunications

Method	Preference Ranking	
	1990	1988
Buy Integrated Systems	1	2
Buy Common Carrier Services	2	1
Use GSA or DCA Services	3	5
Buy VAN Services	4	4
Hire Contractor to Integrate Agency Components	5	3
Buy Components and Integrate In-House	6	6

As reflected in other sections and discussed in Chapter 6, FTS 2000 is the method that agencies will use to meet the majority of their networking needs. In fact, acceptance of FTS 2000 as a viable method of meeting agency needs has been growing steadily.

Although over half of the agencies contacted use VAN services, and increases in the use of VAN services are expected, the majority of agencies expect to obtain these services as part of FTS 2000.

Departments and agencies are facing the need for increasingly complex networks. With FTS 2000 a requirement for meeting most basic federal requirements, there is a growing need for professional and integration services to identify methods for connecting fragmented networks and systems.

C

Technology Trends

1. Voice and Data Services

Voice services continue to dominate federal government telecommunications spending. This is not expected to change in the near future. However, as in the private sector, primary growth is expected in network-based services, with spending for voice services remaining constant or growing at only a modest rate.

Federal agency personnel are evenly divided in their belief about whether voice services will increase or decrease over the next five years, as is shown in Exhibit IV-5. Those believing that expenditures will increase attributed the growth to two reasons.

EXHIBIT IV-5

Federal Telecommunications Spending Directions

Product Category	Percent of Respondents Indicating Spending*		
	Increase	Decrease	Same
Voice	42	42	17
Leased Circuits	73	18	9
VANs	80	0	20
Hardware	78	0	22
Software	78	11	11

*Rows may not add to 100% due to rounding.

First, demand will continue to increase and second, they do not believe that FTS 2000 will result in significant cost savings. In some cases they believe that increased use will be greater than the cost savings, causing an increase in spending. However, all believe that any increases will be modest.

Agencies that believe that spending for voice telecommunications services will decrease attributed the decrease primarily to the use of FTS 2000, believing that savings will offset any growth in use.

Agencies almost universally expect expenditures for leased circuits, VANs, hardware, and software to increase. A small percent expect expenditures to remain the same. Overall, virtually none expect a decline. The responses are understandable. Networks (including reported hardware and software) to connect systems and operating sites will experience significant growth.

Agencies do anticipate significant changes in the mix of voice/data and analog/digital communications during the next five years, as shown in Exhibit IV-6.

EXHIBIT IV-6

Percentage Distribution of Telecommunications Traffic

	Current	Future (1995)
Voice	60	40
Data	40	60
Analog	70	50
Digital	30	50

From 1990 through 1995, data traffic will increase at a much greater rate than voice traffic, with the relative proportions of voice and data traffic favoring data in the late 1990s. Some agencies also noted a requirement for higher data speed and increased accuracy in future communications networks. The growing popularity of facsimile equipment will also lead to more data traffic.

Note that, in INPUT's previous report, the shift from voice to data and from analog to digital was projected to occur in the early 1990s. The

transition has not occurred as quickly as anticipated due to the extended time necessary to select the vendors for FTS 2000 services. During the selection process, many changes were put on hold as agencies analyzed the services that would be available. However, the selection process has only delayed, not curtailed, the shift. With FTS 2000 now being implemented, the shift in emphasis should begin to occur at a steady rate.

Growth in leased circuit and value-added network services is expected by nearly all agencies. However, most agencies are quick to note that the increases will be derived primarily from use of FTS 2000. With the exception of those that have agency-specific requirements, such as security, nearly all expect to use the leased circuit and value-added network capabilities of FTS 2000.

Growth in the number of value-added network users is expected to grow significantly over the next five years. Approximately 50% of the agencies expect to expand their use of value-added network services. However, as with leased circuit services, they expect that the services will be derived from FTS 2000, not from other networks. One of the primary uses will be for electronic mail, which agencies indicate is of high importance.

Both hardware and software are expected to continue to grow. The growth in hardware will be primarily for data network connections. The growth in software is expected primarily to support protocol conversion between older and newer data network services and to provide for local-area network services. Note that this hardware growth is exclusive of expenditures for the replacement or addition of voice systems.

2. Network Management

Effective network management is important to all federal agencies. Agencies indicate that nearly 60% of their agency-specific data networks are managed by in-house staff, and of those managing their own networks, over 70% use a centralized network management approach.

The reasons for managing networks with in-house staff and using a centralized approach are closely aligned with the reasons that many agencies have not considered contracting for network management. Generally, they indicate that vendors would not be able to do as good a job and agencies do not see significant cost benefit.

As indicated in Exhibit IV-7 security and requirements to use FTS 2000 are also cited as reasons for not considering contracting for network management.

EXHIBIT IV-7

Agency Consideration of
Third-Party Network Management

Considered Third-Party Management?	Percent of Respondents	Reasons*
Yes	45	• Lack of Technical Expertise
No	55	• Violates Security Requirements • Not Necessary • High Cost • Must Use FTS 2000

*Not ranked by order of importance.

In contrast to the private sector, where outsourcing of network management appears to be a growing trend, INPUT does not expect the situation to change significantly in the federal government for a couple of reasons.

• Growing use of FTS 2000 reduces the need for major considerations of contracted network management. Agencies have an expectation that FTS 2000 will provide the degree of management necessary to meet their needs. However, if FTS 2000 does not live up to expectations, the situation could change.

• Security requirements continue to dominate the concerns of many agencies. This domination is not expected to change in the near future and could increase. Agencies believe that security requirements necessitate that they retain management control over their networks.

3. Local-Area Networks

The number of proposed LAN projects shown in Exhibit IV-8 has declined significantly over the last two years. In INPUT's previous report, more than 30 different projects were identified for which funding was requested. This year, there are approximately eighteen projects for which funding is requested.

EXHIBIT IV-8

Local-Area Network Funding Requests for Major Agencies

Agency/ Department	Network	Funding ($ Thousands)	Fiscal Years
Air Force	Local-Area Network	18,849	1990-1994
Army	AWIS/Local-Area Network	4,350	1990-1991
Navy	Naval Surface Weapons Center Wide-Area Network (CWAN) Ops.	26,800	1990-1994
Agriculture	State Statistical Office Local-Area Network	18,960	1990-1995
Agriculture	Local-Area Network	414	1990-1995
Agriculture	Local-Area Network for Headquarters USDA	2,376	1992-1995
Agriculture	Upgrade Minicomputer System plus Local-Area Network	952	1990-1995
Agriculture	Department Local-Area Network	361	1990-1995
Agriculture	Local-Area Network for Human Resources Division—Animal & Plant Health Inspection Service	67	1990-1995
Agriculture	Network for Headquarters and Field (ARS)	125	1990
Agriculture	Network (PC-LAN) Computer System	1,950	1990-1994
Energy	Local-Area Network	4,665	1991-1995
HHS	Records Management System— including Local-Area Network (FDA)	17,135	1990-1995
HHS	Local-Area Network— Office of Secretary	11,213	1990-1995
Justice	Data Communications—Local-Area Network	25,626	1990-1995
NASA	ISC Center Information Network	10,266	1990-1995
Transportation	Local-Area Network Backbone	1,200	1990
IRS	Counsel Automated System Environment	47,846	1990-1995

The difference in the number of projects reflects the extent to which local-area networks have been implemented over the past two years. It is also indicative of a shift in focus.

With more than 90% of agencies currently using local-area networks to some extent, emphasis is shifting toward projects to integrate networks that have already been installed. Over the next five years, agencies expect that more than 85% of their local-area networks will be integrated.

Integration methods vary considerably, depending on the agency. Agencies whose activities are highly centralized plan to implement building and campuswide network structures. Those that are geographically dispersed expect to be able to link local (office) networks to FTS 2000 to achieve national integrated network capability.

The high interest in local-area networks is evidenced by a number of plans announced and proposed by both military and civilian agencies and departments. The examples given are projects for which funding was previously requested.

- The Social Security Administration plans to install more than 60 LANs costing nearly $5 million.

- The Navy Department has been reviewing proposals for acquisition of more than 8,000 LANs supporting more than 300,000 PCs. Under the contract, expected to be let near the end of 1990, the contractor is expected to be able to deliver more than 300 LANs per month. Other departments are permitted to order LANs under the contract, valued at an estimated $200 million.

- NASA is experimenting with alternatives to provide transparent interconnections with IBM's SNA architecture. Linking local-area networks with SNA is being considered by a number of agencies.

- In search of ever higher speeds, NASA's research center is connecting Ethernet networks through a 100Mbps FDDI backbone network. NASA provided for the FDDI capability when its center was designed.

- The Air Force, faced with a dilemma about which of two local-area network protocols to support for its Unified Local Area Network Architecture (ULANA) program, has asked TRW and EDS to work together to provide a means of supporting both protocols.

Recognizing the growing need for local-area networks, the GSA recently awarded new multiple-award schedule contracts to eleven firms. This is a reduction from the previous 30. GSA intends to speed the process of acquiring LANs by limiting the contractor schedule to firms that can

provide a total solution. Projects awarded to these contractors could range from $300,000 to several million dollars.

4. Network Integration

Federal agencies do not attach as much importance to integrated network services as do their counterparts in the private sector.

As shown in Exhibit IV-9, agency representatives consider integrated network services to be of only average importance, and only half have plans for comprehensive network integration projects. (Network integration refers, in this context, to the integration of voice, data, and text services into a common network.)

EXHIBIT IV-9

Agency Use of Integrated Network Services

Average Importance Rating*	Percent Planning Network Integration through FY 1995
3.31	54.0

*1 - 5 scale, where 5 = very important and 1 = not important at all.

In contrast, private sector organizations rate integrated networks as very important. INPUT believes that there are two primary reasons for the differences.

- The first is that many federal agencies do not have the same needs for a wide range of complex networks.

- The second is that federal agencies look to FTS 2000 as the primary means of accomplishing network integration. From available data, agencies believe that FTS 2000 will be able to meet the majority of their known needs.

5. Satellites and VSATs

Neither VSAT nor the capabilities of large satellite systems hold a great deal of interest for federal agencies. The Department of Agriculture expresses interest in VSAT-type systems as a low-cost method of data distribution, but the interest is mild.

Although 47% of the agencies indicate that they are currently using some type of satellite service and 40% have considered VSAT services, most satellite services are used as a backup to terrestrial networks. As indicated in Exhibit IV-10, the importance of satellite services to meet agency network needs by 1995 is considered to be of less than average importance.

EXHIBIT IV-10

Importance of VSATs and Satellite Systems

System Type	Average Importance by 1995	Rating Explanation
Satellite	2.4	• Little or No Requirement
VSAT	2.5	• Little or No Requirement • Low-Cost Solution • Effective Data Distribution

6. Cellular Communications

Cellular communications are viewed as having very limited application in meeting agency telecommunication needs. They are generally considered costly and have only limited functionality when considering overall agency needs. Rating the importance of cellular communications by 1995, agencies indicated that this technology will be of very little importance.

7. E-Mail and EDI

Agencies consider network services such as electronic mail (E-Mail) and electronic data interchange (EDI) to be of high importance.

Agencies recognize the value of electronic mail and plan to use this FTS 2000 service at the earliest possible time. Overall, agencies that need to interact with offices around the country consider E-Mail to be of very great importance. Those with activities concentrated in a single geographic area consider the service to be important, but not to the same extent as agencies that are nationally dispersed.

Electronic data interchange is also of great importance to many federal
agencies. EDI received the highest rating from those agencies that
interact financially with the private sector. Average ratings for E-Mail
and EDI services are shown in Exhibit IV-11.

EXHIBIT IV-11

**Agency Importance Ratings
of Network Applications**

Application	Average Rating*
Electronic Mail	4.3
EDI	3.1

*1 - 5 scale, where 5 = very important,
1 = not important at all.

Note: for period 1990-1995.

Note should be made that agencies that have a high degree of financial
interaction with the public consider EDI to be of greater importance.
While they are waiting for standards to become more settled, agencies are
expected to have high interest in EDI services.

8. ISDN

Characterized by some as a technology waiting to emerge or a techno-
logical Catch-22, ISDN is being watched carefully by nearly all federal
agencies and departments.

Providing an ability to integrate voice, data, text, and image onto a single
transmission medium, federal agencies recognize that ISDN provides
significant opportunity to improve their operations and, potentially,
reduce costs. They also recognize that a lack of standards results in a
Catch-22, where the wide variety of equipment will frequently not work
with ISDN-based equipment.

However, recognizing benefits, some are forging ahead with major
projects.

* The Air Force began testing of a facilitywide ISDN network in 1987.
  Since there were no model contracts to work from, the Air Force
  prepared a contract for a Base Integrated Digital Distribution System
  (BIDDS). The pilot project has been running at Mather Air Force Base

(California), and, based on the test results, the Air Force expects to move the project to Barksdale Air Force Base (Louisiana) early next year.

- In one of the largest single conversion efforts, Lawrence Livermore Labs has converted more than 10,000 users in 600 buildings from their previous Centrex service to 8,000 ISDN circuits. Even with the additional responsibilities for network management, the Labs expect to save money.

- The Department of Energy has taken a different approach, contracting with U.S. West to provide ISDN-based Centrex services to one of its facilities in Rocky Flats, Colorado.

With interest high and several agencies moving ahead aggressively, the GSA is preparing a package of related contracts to make ISDN available as agencies identify specific needs. However, with the exception a number of specific cases, growth is expected to be slow.

For the rate of growth to increase, vendors will need to be able to identify specific sets of services and to ensure compatibility of the equipment needed to deliver the services. To date, vendors have not been able to identify specific services for which there is an overriding need to commit to ISDN.

D

Agency Perspectives

INPUT asked agency officials their views on major nontechnical impacts on federal telecommunications. Agency officials also provided suggestions for improvements that vendors could make in telecommunications systems and services to increase their value to the government.

1. Nontechnical Impacts

Most agency officials felt that legislative and regulatory policies will continue to influence their plans and acquisitions for the foreseeable future. Agencies cannot predict the timing or effects of additional FCC and OMB actions and consequently encounter difficulty in forecasting telecommunications costs and acquisition schedules. Governmentwide or agencywide telecommunications programs need to reflect agency telecommunication needs and be supportive of these needs.

Every agency expressed concern over congressional budget actions to counteract the rising federal deficit. In general, agencies with security or emergency-preparedness missions felt less threatened by budget cuts. In periods of budget reduction, use of telecommunications facilities, such as teleconferencing, gains favor as a cost-effective alternative to travel. FIRMR Bulletin 16, Travel by Federal Telecommunications System, substantiates this view.

Reductions in the DoD budget would force some reprogramming of telecommunications funds. In most cases, strategic and tactical systems receive priority. However, base communications modernization programs lose funding or are deferred to later years.

2. Effectiveness of Telecommunications Use

Agencies consider their effectiveness in using telecommunications products and services to be average. This rating is not dissimilar to the private sector. However, the reasons for not making greater use of telecommunications to meet organizational needs are somewhat different than those of the private sector.

As shown in Exhibit IV-12, agencies believe that they have little need for telecommunications technology. They also believe that there is a lack of planning and that they need integrated products and services.

EXHIBIT IV-12

Effectiveness of Telecommunications Use

Average Rating*	Rating Explanations
3.3	• Little Need of Technologies • Lack of Planning • Need Better Integration of Services

*1 - 5 scale, where 5 = very effective, 1 = not effective at all.

Private sector organizations frequently identify lack of planning and the need for integrated services as reasons for not using new technology. However, the private sector acknowledges a need for telecommunications technology.

Federal agencies believe that there is a lack of need for telecommunications technology. INPUT does not dispute the agencies' perspective, but believes that this perspective must be viewed in light of several factors.

• In INPUT's survey, agencies rated the need for products and services such as local-area networks and electronic mail very highly. This reflects a need for telecommunications-based technologies. They also consistently noted a need to integrate local-area networks and to provide network interoperability.

- The contract for FTS 2000 provides for a wide range of services and features. The ability to add the latest products and services to FTS 2000 suggests a need to make use of current telecommunications technology.

- The fact that use of FTS 2000 is mandated, except in specific cases, suggests that most agencies will meet the majority of their needs through FTS 2000. Most agencies believe that FTS 2000 will be able to meet the majority of their needs.

With these considerations in mind, INPUT believes that agencies do have a need for telecommunications technologies. Agencies' responses therefore indicate that they do not have needs beyond the features and services that will be readily available to them.

INPUT also believes that federal agencies would make greater use of telecommunications technology if products and services were integrated and provided the necessary degree of interoperability.

3. Driving Forces

Federal agencies identified a number of positive factors that will affect the telecommunications market over the next five years, as shown in Exhibit IV-13.

EXHIBIT IV-13

Driving Forces

Factors	Rank*
Technology Advances	1
Price Reductions	2
Data Distribution Demands	2
Voice Mail Availability	4

*Rank based on frequency of mention by respondents.

- Technological advance is the most frequently mentioned force behind greater use of telecommunications. Advances that agencies believe will contribute the most growth are LAN internetworking products and electronic mail services. Network management tools are also important. Managing local-area networks is of growing concern to the agencies.

- Price reductions and needs to distribute data are rated nearly equally. Agencies believe that costs will continue to come down, driving telecommunications use as an alternative to face-to-face meetings. The need to disseminate data will also contribute to increased telecommunications use.

4. Inhibiting Factors

Although technology advances and declining prices will stimulate increased use of telecommunications, the political environment and security considerations will have the greatest inhibiting effect. As shown in Exhibit IV-14, these two factors lead the list of negative factors affecting the use of telecommunications.

EXHIBIT IV-14

Inhibiting Factors

- Political Relations

- Security Issues

- Cost/Available Funding
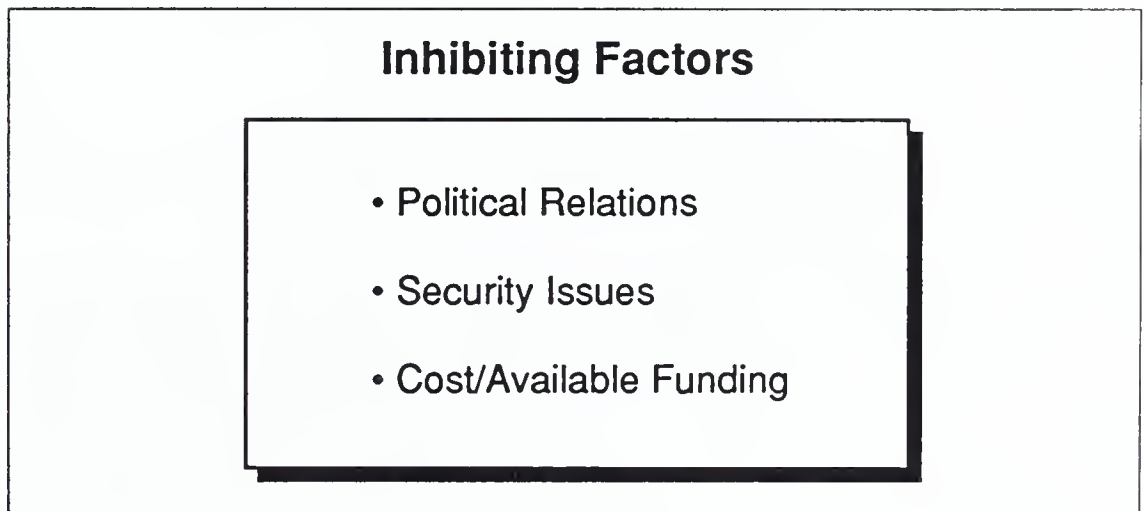
When considering political relations, agencies are generally referring to the ability of the legislative and executive branches of government to reach agreement on budgets and funding levels.

The global political situation also has an impact on the rate of telecommunications spending. Global political tensions tend to result in increased communication, and increased spending for new facilities. Reduced political tensions ease the demand for increased communications.

Growing concerns about security will have an inhibiting effect on investment in new telecommunications services. Agencies and departments with high security requirements will not make major investments unless they can obtain significantly enhanced security capabilities.

5. Vendor Weaknesses

Lack of knowledgeable personnel and a low level of support lead the list of vendor weaknesses. Agencies believe that vendors have only one interest: sale of a specific product, as shown in Exhibit IV-15.

EXHIBIT IV-15

Vendor Weaknesses

Weaknesses	Percent of Respondents
Lack of Knowledgeable Personnel	30
Low Support/Service Levels	30
Proprietary Systems	10
Volume-Sensitive Pricing	10
Inadequate Technology	10
Business Attitude	10

Federal agencies express interest in trends and directions in the telecommunications industry. Agencies have little interest in dealing with vendors who have knowledge of only one product or product line, or who have little knowledge about how the federal procurement process works. A consistent theme resulting from interviews with agencies is that agencies are continually having to educate vendors in federal processes and practices.

Agencies express little satisfaction with the after-sales support provided by most vendors. Results of interviews indicate clearly that vendors that provide consistent, high-quality after-sales support will be viewed more favorably than other vendors.

6. Agency Recommendations to Vendors

One of the observations made most frequently by agencies contacted is that vendors should improve their image with federal officials through better pre- and post-sales support. Agency officials frequently commented on the vendor-buyer business relationships. Vendors are too *opportunity*-oriented and are only concerned with making the next sale.

To most agency representatives, after-sales support is more critical than sales or implementation support. Although sales and implementation support is important, support that provides ongoing education and ensures industry awareness is of greater value to agency respondents.

Although FTS 2000 may address some issues, network interoperability is a high-priority requirement. The growing number of LANs and the need for electronic mail services necessitates an ability to communicate between disparate networks.

Closely aligned with support is the need for education and training. With a less technically knowledgeable staff, continuing training programs are necessary. In addition, the federal procurement process insulates many decision makers from the latest technology. Education is necessary to ensure that program managers and policy makers are aware of technology that is available.

In addition to these recommendations, summarized in Exhibit IV-16, agencies frequently mentioned other recommendations.

EXHIBIT IV-16

Agency Recommendations to Vendors

Services/Products	Rank*
More Service/Support	1
Interoperability of Products	2
Better Education/Training	2
Integrate Services	4
New Technology	4

*Rank based on frequency of mention.

Most agencies want vendors to work toward and support common telecommunications standards, even though the OSI reference model has not yet become effective. Vendors should address the government's protracted problems with system interconnection and interoperability by supplying compatible hardware architecture and communications protocols. In most cases, however, this is incompatible with the vendors' marketing thrusts.

Agency officials noted a growing need for secure telecommunications, including end-to-end encryption. Vendors should develop additional and more-secure systems and services. Current PBX equipment and facilities were mentioned as being particularly difficult to secure.
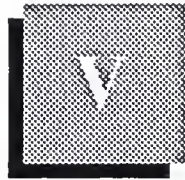
Implications of FTS 2000

A
Background

In its original form, the FTS 2000 program provided for the replacement of the FTS through a single contract with a prime services vendor. The vendor awarded the FTS 2000 contract would provide the federal government with a variety of telecommunications services. These service include:

* Switched voice
* Switched data
* Packet switching
* Video transmission
* Switched digital integrated and dedicated transmission

GSA estimated the initial contract value of these services at between $400 and $450 million a year and would possibly reach as much as $25 billion over the ten-year period. GSA will neither lease circuits nor purchase hardware or facilities in support of FTS 2000.

Although the term of the initial FTS 2000 contract would extend over ten years, the contractors would be given no guarantee of system usage after the first three years, which conforms with the length of FTS 2000 subscription agreements to be executed between GSA and individual agencies. The FTS 2000 program was delayed by agency opposition, vendor complaints and protests, GAO audits, and congressional concerns.

In 1987, in response to congressional pressure, the General Services Administration withdrew the original RFP to revise it. In the revised RFP, two contracts would be awarded on an approximately 60/40 allocation of the $450 million minimum guarantee revenue. Separate Service Oversight Centers (SOCs) would handle each contract. The contract was awarded in late 1988, with AT&T winning 60% of the contract value. U.S. Sprint was awarded the other 40%.

FTS 2000 represents a significant change in GSA's approach to providing telecommunications services. As part of the FTS 2000 contract, GSA is purchasing telecommunications service, rather than leasing the equipment, and GSA will oversee the contractors' management of the system, rather than manage the system itself.

A key element of FTS 2000 is that organizations are required to use it unless a specific exemption is obtained. To ensure its use, Public Law 100-440 was passed in September 1988, mandating use of FTS 2000. To gain an exemption, two key criteria have to be met.

- An agency's requirements must be sufficiently unique that they cannot be met by FTS 2000.

- The agency's procurement to satisfy the unique requirements must be cost-effective and not adversely affect the cost-effectiveness of FTS 2000.

As a result of the Public Law, GSA suspended 18 delegations of procurement authority issued prior to the award. Of the 18, GSA determined that the requirements of 14 could be met by FTS 2000. Only 4 organizations were permitted to proceed with their own procurements. Since awarding FTS 2000, GSA has reviewed 54 requests for procurement authority. Of the 54, GSA has not granted any additional exemptions from using FTS 2000.

B

Status of Cutover

Considering the complexity of converting systems serving an estimated 1.3 million people, the process of converting from FTS to FTS 2000 has progressed smoothly. With a few exceptions, resistance has not been as great as initial indications suggested it might be. Agencies, particularly smaller ones, have generally accepted FTS 2000 as the option of choice for voice and basic data services. Conversion of voice systems for the majority of the federal agencies and departments was essentially completed by mid-year 1990.

Smaller departments that have few data network requirements and rely almost solely on FTS were among the earliest to convert. Larger agencies that have complex requirements, have extensive national service requirements, and, in some cases, provide services for other agencies, are converting as quickly as the job complexity permits. Major agencies such as Agriculture and Treasury have already implemented plans to convert their voice systems and expect to use the data network capabilities of FTS 2000 as conversion plans can be implemented.

Use of FTS 2000 for data networking needs is proving to be the greatest obstacle; a number of agencies and departments indicate they plan on continuing to use agency-specific networks. The obstacles center on two key issues:

• Security requirements lead the list of reasons that departments such as State and Defense give as to why they should be permitted to continue to use organization-specific data networks. State and Defense indicate that they will continue to use networks such as DDN (Defense) to meet their needs. The State Department believes that the sensitivity of its E-Mail services is sufficiently high to justify a waiver to use its own network.

  - Following an outright refusal to use FTS 2000, negotiations between Defense and GSA resulted in an agreement for Defense to use FTS 2000 for identifiable, nonsecure administrative purposes. Defense also agreed to work to identify nonsecure voice traffic that is currently incorporated in its networks and shift the traffic to FTS 2000.

  - Defense also indicated that it would consider the identification of nonsecure data traffic and shift this traffic to FTS 2000. However, Defense noted that isolating secure and nonsecure data traffic would take time.

• Unique operational requirements are also considered to be a legitimate reason for granting an exception to using FTS 2000 for data networking. Following meetings with GSA, NASA was granted permission to continue to use its NASCOM network to meet NASA's networking needs. NASA's chief argument against using FTS 2000 is that the agency's requirements are sufficiently critical that it cannot accept the risk of being impacted by network congestion that could impose throughput delays.

In addition to pure network issues, unique service needs are also considered reasons for special exemptions. The National Institute of Allergy and Infectious Diseases (NIAID) was granted an exemption to use MCI-Mail rather than the E-Mail facilities available as part of FTS 2000. The exemption was granted based on the Institute's need to send and receive messages to and from a wide variety of nonfederal organizations that are not connected to FTS 2000.

Recognizing that there are legitimate needs for continuing to procure services outside FTS 2000, GSA has granted a number of blanket exemptions, including the following:

• The Department of Defense is exempt from requesting authority to procure equipment and services from GSA because of requirements pertaining to DoD's command and control function.

- The Nuclear Regulatory Commission has received an exemption for procurements related to the Emergency Telephone System and the Regional Office Incidence Response Center.

- The Federal Aviation Administration has received an exemption for procurements related to facilities and services for air traffic control.

- The Department of Energy is exempt for procurements related to five Regional Power Administrations.

- The Department of Veterans Affairs is exempt for procurements related to facilities installed in hospitals for biomedical communications.

- The National Aeronautics and Space Administration is exempt for procurements related to missile and satellite tracking facilities.

- The Tennessee Valley Authority is exempt for procurements related to operation of the Tennessee Valley Authority projects.

- The Department of Justice/Bureau of Prisons was exempted for procurements related to facilities installed in penal or correctional facilities. The Bureau of Prisons has subsequently agreed to use FTS 2000.

Although the conversion of voice is moving reasonably smoothly and concerns over data networking remain, some agencies have begun to use some of the more advanced capabilities of FTS 2000. The EPA is already involved in a $150,000 test of the video conferencing capabilities of FTS 2000. EPA indicates that it has strong interest in using video conferencing among 15-20 offices nationwide. EPA believes that the costs will be more than offset by savings in travel.

C
Service Scope Issues

As with many large contracts, questions about the provision of functions and features that have been either not specifically addressed or addressed in only a broad sense result in questions by users and vendors. FTS 2000 is no different.

Since awarding the contract for FTS 2000, questions and concerns have been raised about a number of services. The most notable ones are discussed below.

1. International Service

The program requires that FTS 2000 "...provide interconnectivity between FTS 2000 and IDDD gateway carriers who provide IDDD services to federal agencies."

Though both AT&T and Sprint are 'international gateway carriers', the contract does not preclude other international record carriers (IRCs) or recognized private operating agencies (RPOAs) that have agreements with the federal government from providing international carrier services.

Not specifically stated in the RFP is whether interconnectivity is limited to voice services or would include data services. However, data service provision is implied by the specification that FTS 2000 provides service only to the continental United States, Alaska, Hawaii, Puerto Rico, and the U.S. Virgin Islands.

2. Security and Encryption

Security and encryption have been raised as issues by several agencies and have been used to obtain exemptions from use of FTS 2000. Most notable are the Defense and State Departments, which have high requirements for classified voice and data transmission.

From a vendor's standpoint, security and encryption should not be major issues. The FTS 2000 RFP is clear in stating that "...FTS2000 shall be used...to transport Sensitive But Unclassified (SBU) traffic." By omission, the FTS 2000 contract is clear in stating federal agencies are responsible for ensuring the security of their data.

- The FTS 2000 network, however, will be able to transmit voice and data traffic that has been encrypted by federal agencies and departments. When encryption is necessary, the agency or department requiring the encryption is responsible for providing the encryption and decryption of traffic (voice or data) entering and leaving the network.

- The FTS 2000 network is clearly intended to meet the general business needs of the majority of federal agencies and departments, not provide for extraordinary security requirements. For high-level security requirements, agencies or departments can either provide for their own security or, in the case of the Defense and State Departments, obtain exemptions from use of FTS 2000.

3. Toll-Free Service

The recent granting of permission to Sprint to provide toll-free call-in service for IRS customers has raised a question of concern to many vendors. Although FTS 2000 was intended to provide a baseline network that would evolve over time as new technologies became available, granting permission to provide a service that is currently available and not specified as part of the FTS 2000 RFP raises the question of whether GSA will consider *any* service to automatically fall within the bounds of the FTS 2000 contract.

Although MCI's protest over the toll-free (800) service has yet to be resolved, INPUT believes that GSA will continue to view the FTS 2000 network as a basic infrastructure from which new services can be added. INPUT also believes AT&T and Sprint will be in the best positions to provide new or enhanced services. This positioning will likely put other vendors at a competitive disadvantage.

4. On-Net/Off-Net Services

Although little notice has been taken, a question arises as to the extent to which AT&T or Sprint can provide services within a geographic area for which neither organization has operating authority.

As specified in the Modified Final Judgement resulting from the AT&T divestiture, interexchange carriers such as AT&T and Sprint are permitted to provide service between, but not within, small geographic areas such as a single city.

A notable example is the WITS (Washington Interagency Telephone System) network within the Washington, D.C. metropolitan area. Since C&P Telephone, through Bell Atlantic, has operating authority within the Washington area, neither AT&T or Sprint is permitted to provide service within the area.

FTS 2000 provides for the interface of interarea (on-net) and local-area (off-net) transmission, but with prices becoming increasingly competitive, agencies that have a requirement for local service may need to obtain local services more economically.

Vendor opportunities may exist for the provision of local-area services. With local-area network connectivity becoming increasingly important, opportunities may be found for development (and possibly management) of metropolitan-area networks (MANs) serving agencies in multiple facilities within the same area. Though connectivity must be made to FTS 2000, neither Sprint nor AT&T is able to provide local-area connectivity.

5. Timesharing Services

Some confusion persists as to the role that FTS 2000 will play in the acquisition of timesharing services. GSA's decision to cancel the Teleprocessing Services Program at the end of FY 1990 may aggravate this problem. It appears that some vendors will be allowed to use FTS 2000 in pricing their services, but INPUT does not expect its use to be mandatory. However, given the volatility of FTS 2000 scope issues, GSA may mandate other approaches.

The use of FTS 2000 becomes more complicated when one agency buys timesharing services from another. For example, the Labor Department does much of its data processing at the National Institute of Health (NIH) computer center. The Department of Labor belongs to Network B (Sprint), whereas NIH belongs to Network A (AT&T). It has not been determined which vendor will receive the business.

6. Additional Services

As reflected in MCI's protest over the toll-free service, one of the more serious questions facing many vendors is the extent to which new or enhanced services will be automatically included as part of FTS 2000.

INPUT believes that GSA will seek to include new or enhanced services under the FTS 2000 umbrella. Although not specifically stated, vendors generally agree with this perspective. As discussed later, vendors note that one of the impacts of FTS 2000 is to shift their marketing focus from marketing to agencies to marketing to FTS 2000 service providers. Vendors believe that there will be increased emphasis in providing sets of bundled services, through the FTS 2000 program.

Although the legality of including new (currently unspecified) services within the framework of FTS 2000 has yet to be resolved, statements from GSA clearly reflect its view of FTS 2000 as a baseline infrastructure to which services will be added as they become available.

7. Service Pricing

As evidenced by the intense competition for large federal contracts, pricing and costs are issues. FTS 2000 is no different. Articles appearing in trade journals suggest that, for specific services, AT&T and Sprint FTS 2000 costs could be anywhere from 30% to 80% higher than commercially available rates—from the same companies.

Although cost and optimal price performance must always be a consideration, the exact relevance of extensive discussion about costs may be a moot point. Because use of FTS 2000 is mandated and agencies are assigned to use either AT&T or Sprint, there is little need to evaluate alternatives.

However, there is a need to ensure that agencies are receiving the best price/performance within the framework of the available services. To address the need, GSA has encouraged development of programs to let agencies evaluate the costs of alternative network designs. To date, several programs have become available.

- AT&T has developed a service to permit users of AT&T's FTS 2000 network to access its Service Analysis Tool. The program will permit

users to obtain the latest information about service prices to meet specific requirements.

- SRA Telecommunications Inc. has developed a program called Pricer. Pricer permits analysis of costs for voice and data for the AT&T and Sprint networks. The product is PC-based and provides batch and interactive capabilities. Pricer is reported to be available for a purchase price of $5,000.

- I-NET distributes a program developed by Quintessential Solutions, Inc. Unlike SRA's product, I-NET's product provides analysis for data networks only. The product is PC based and is licensed for a minimum of $7,000. The annual maintenance fee is $4,500.

These products may be useful to system integrators who must bid FTS 2000 as part of their proposed solutions.

Though billing, budgeting, and network optimization features are important to agencies, the greatest benefits of these programs will be to systems integrators. Determining optimal (data) network configuration is a complex analysis of price versus performance. With limited technical expertise, agencies developing complex systems will turn to systems integrators. The integrators will need tools to develop optimal network configurations.

D

Agency Understanding and Acceptance

As noted in Chapter IV (Exhibit IV-1), if given a choice users generally prefer to buy integrated telecommunications systems or buy services directly from common carriers. However, agencies recognize that, for the most part, they do not have a choice.

Considering that FTS 2000 is mandated as the method to meet voice and data networking needs, agencies generally believe that FTS 2000 will meet their data networking needs through 1995, as shown in Exhibit V-1. However, there were a number of dissenting opinions that kept ratings from being higher.

EXHIBIT V-1

Expected FTS 2000 Effectiveness

3.6

| 1 | 2 | 3 | 4 | 5 |

Not at All ⟵ ⟶ Very

Effectiveness
Average Rating
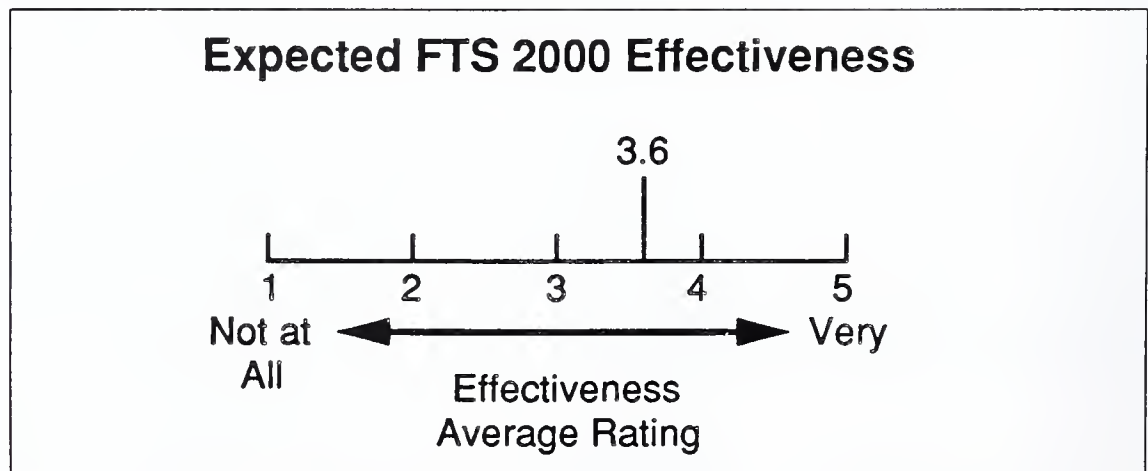
- Primary concern relates to the ability of FTS 2000 to successfully provide the breadth of data network requirements that users believe they will have over the next five years. Data network needs are expected to be the driving force behind growth in federal telecommunications services and, with a wide variety of needs, agencies are not convinced that FTS 2000 will be able to successfully address the wide variety of networking standards and protocols that exist.

- Agencies are also concerned about the costs of FTS 2000. Although acknowledging that voice service costs will most likely be comparable to existing rates, there is a lack of specifics about costs for data network requirements. Without specifics about data networking costs, users are concerned that there might be some surprises.

Notwithstanding the concerns that have arisen, agencies expect to be users of FTS 2000 for voice and data services over the next five years. As shown in Exhibit V-2, the number of agency-specific networks will decline sharply by 1995.

EXHIBIT V-2

Networks Used to Meet Agency Data Network Requirements

Network Type	Average Percent of Network Requirements Met	
	Currently	By 1995*
FTS	11	0
FTS 2000	22	73
Agency-Specific	67	26

*Totals do not equal 100% due to rounding.

Although agencies have concerns over features and costs, they believe that the service is fundamentally good and that issues will be resolved. They believe that most services will be available when they are required.

E

Vendor Perceptions

When considering the federal sector, vendors and users (agencies) are closely aligned in their beliefs about how effectively telecommunications are used in the federal government and the impact that FTS 2000 will have on vendors.

EXHIBIT V-3

Vendor Perception of Federal Government's Effective Use of Telecommunications Systems and Services

Overall Rating*	Reasons	Percent of Responses
3.0	• Technical Expertise Lack	36
	• Resources Used Inefficiently/ Duplicated	27
	• Procurement Process Lengthy	18
	• Distributed Processing Not Maximized	10
	• Funding Problems	10
	• Aging Technology	10

*Rating scale 1 - 5, where 5 = very effective, 1 = not effective.

Note: Totals do not equal 100% due to multiple responses.

Vendors perceive that the federal government uses telecommunications with no greater than average effectiveness, as shown in Exhibit V-3. Agencies rated their own effectiveness almost the same, for nearly the same reasons.

The agencies and vendors agree that a lack of technical expertise is a key reason that telecommunications technology is not used more effectively. The agencies consider funding problems to be a higher contributor to the problems than do vendors. This discrepancy is understandable, since many vendors to not understand the complexity of the federal funding process.

When considering the impact that FTS 2000 will have on vendors, INPUT was of the belief that the impact would be perceived to be more

significant than vendors reflect. As shown in Exhibit V-4, vendors rated the overall impact to be less than high.

EXHIBIT V-4

FTS 2000 Impact on Vendors

Overall Rating*	FTS 2000 Impact on Vendors
3.69	• Defines Connectivity Products • Shift Marketing to Bundled/ Embedded Procurements • Shift Marketing to FTS 2000 Vendors • Market is Larger • Less Revenue for Other Vendors

*Rating scale 1 - 5, where 5 = major effect, 1 = no effect.

- While carriers rated the impact high or very high, providers of software, hardware, and other services rated the revenue impact at the bottom of the list. The majority of the impacts centered on the approach to marketing products and services, not the potential opportunity.

- Rating the definition of connectivity products at the top of the list, by frequency of mention, vendors are also reflecting a stabilization of the market. With the primary network providers now defined, vendors are able to better understand standards and identify products that will successfully connect with the network.

- Vendors reflect also that with the direction of FTS 2000 now established, the overall market could actually grow. Many agencies have held plans in abeyance pending the outcome of FTS 2000 decisions. Agencies can now move forward.

Vendors generally view FTS 2000 in the same way as agencies. They rate the effectiveness as high, as shown in Exhibit V-5. The primary reason that the rating is not higher is due to a perceived limitation in the number of services. However, most also agree that the base of services is sufficiently broad to meet the needs of most agencies.

EXHIBIT V-5

V-12

FTS 2000 Effectiveness through 1995

Overall Rating*	Reasons	Percent of Respondents
3.69	Is Limited in Services	46
	Provides Almost All Needs	15
	None	39

*Rating scale 1 - 5, where 5 = extremely effective, 1 = not effective at all.

While the vendor community generally believes it can work within the framework set by the presence of FTS 2000, vendors also believe that FTS 2000 and federal budget cuts are the two most significant inhibitors to their realizing greater potential from the federal market, as shown in Exhibit V-6.

EXHIBIT V-6

Vendor Perceptions of Market Inhibiting Factors

Market Inhibitors	Percent of Respondents
FTS 2000	50
Federal Budget Cuts	50
Acquisition Process	25
Contract Durations	25

Note: Multiple responses permitted.

F

Prospects for Vendors

INPUT believes that FTS 2000 will have positive and negative impacts on vendors. Key negative impacts will be on providers of basic voice services such as common carriers and other providers of voice-based services. However, even within the area of voice services there are potential opportunities.

Key positive impacts will be in the provision of data-related services. With FTS 2000 now being implemented, agencies that have been holding back on data network plans are expected to move forward to develop improved networking services. Although data must be transported over the FTS 2000 network, agencies are free to develop systems and interfaces to meet their needs.

The following provides a summary of areas where INPUT believes there could be increased or decreased opportunities. Note that the majority of the increased opportunities fall within the general area of data networking.

- Few, if any, opportunities are expected for the provision of basic voice services. With AT&T and Sprint providing interexchange services and local carriers providing the majority of local-area services, there appear to be few major opportunities. Likewise, since FTS 2000 requires the availability of SS7 digital-based service, many enhanced voice services will be available as part of FTS 2000.

- One voice-related service that has grown significantly in the private sector and which could afford opportunities in the federal sector is voice messaging systems. Voice messaging is not specified as a requirement of FTS 2000 and, since the service is implemented locally, it would not generally fall within the context of the FTS 2000 contract. With federal agencies seeking to increase service, voice messaging could offer opportunities to increase customer service.

- There are two areas in which INPUT believes there are potentially significant opportunties for vendors.

  - The first relates to local-area networks. Agencies are placing increased emphasis on integrating disparate local-area networks and, for agencies with offices throughout the country, connection to FTS 2000 is necessary. Software and hardware that will provide connectivity between LANs and FTS 2000 should be in high demand over the next several years.

- The second relates to the interface of the wide variety of network standards and protocols of existing agency-specific networks with FTS 2000. Although many agencies expect FTS 2000 to meet wide-area networking needs, an extended period of time will be necessary for common standards to be implemented. In the meantime, hardware and software products that link old and new products and services will be needed.

Successful vendors will be those that are able to adjust their sales and marketing approaches. They will recognize that multiple marketing efforts are now required.

• Vendors will need to provide increased education to federal agencies. Providing education will increase their visibility as quality providers and will ensure understanding of how the vendor products interact with FTS 2000.

• Adjustments need to be made to marketing strategies and tactics. Successful vendors will develop marketing strategies directed toward supporting and interacting with AT&T and Sprint (FTS 2000) products and services.

FTS 2000 will clearly have an impact on providers of basic services. However, there will be increasing opportunities for providing connectivity products and enhanced network services.

VI
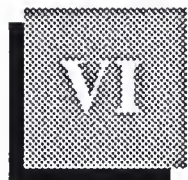
Competitive Trends

A
The Marketplace

As explained in Section III, INPUT has broken the federal telecommunications market into four segments:

- Leased Telecommunications Services
- Telecommunications Equipment (Hardware)
- Telecommunications Professional Services (made up of Telecommunications Maintenance Services and Telecommunications Technical Support)
- Network Services

In its competitive analysis, INPUT has further divided the first three of these segments into single and bundled subsets. (Note that the federal supply codes do not lend themselves to an analysis of network services as INPUT defines it. Network services are generally included as part of leased telecommunications services.)

Vendors and values appearing in a single market segment represent contract actions that contain only the Federal Supply Codes (FSCs) for products and services that define that market segment. The bundled market segments contain contract actions that involve at least one of the selected Federal Supply Codes as well as any other Federal Supply Code or Codes.

For example, a single contract for leased telecommunications services should contain ONLY the FSC for leased telecommunications services, and nothing else. A bundled contract in the same segment would include the FSC for leased telecommunications as well as other FSCs for anything from computer security equipment or other ADP supplies to X-ray equipment or garbage collection services.

As one might expect from the example, each of the segments that make up the federal telecommunications market contains a percentage of single and a percentage of bundled contract actions. The following exhibits

show the single versus bundled breakout for each market segment or subsegment. Analyzing the composition of each market segment helps to contrast the concentration of funding for specialized product or service contracts (single) with funding for contracts for multiple products and services (bundled). With knowledge of the contract types, vendors may better select the market segments that will offer the greatest opportunities.

1. Leased Telecommunications Services

Exhibit VI-1 shows the percentage of total federal leased telecommunications service obligations that originated through single and bundled contracts. The total represents all obligations for federal leased telecommunications for fiscal years 1987 and 1988. Single purchases of these services accounted for 62% of all obligations for the period. Obligations resulting from bundled contracts accounted for 38% of the total. Of the bundled contracts, approximately 22% of the obligations are for related products and services.

Note that, for the purpose of this calculation, amounts related to other obligations have been eliminated since other obligations may not relate to telecommunications services. The calculation therefore directly compares the percentage of services derived from single contracts and that derived from bundled contracts.

EXHIBIT VI-1

**Leased Telecommunications
Percent Single versus
Bundled Contracts, 1987-1988**

From Bundled
Purchases

38%

From Single
Purchases

62%
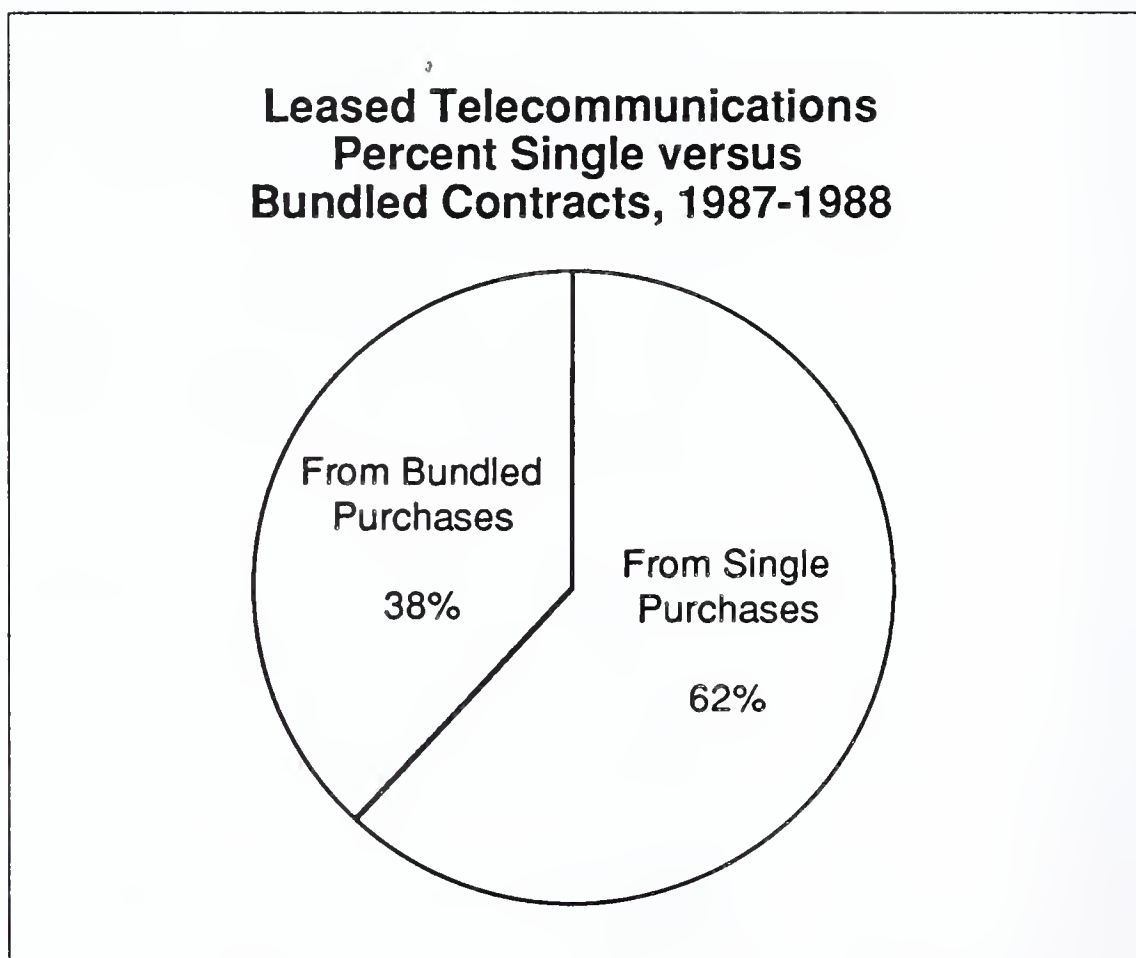
Note also that, in INPUT's previous report, single purchases represented 95% of the total for this segment. INPUT believes that the shift results primarily from a bundled DCA contract valued at more than $400 million. If the DCA contract were to be eliminated from consideration, INPUT believes that the percentage of single purchases would be closer to the 95% level.

Exhibit VI-2 shows the top three other products and services purchased through the same contract as leased telecommunications. The percentage represents the proportion of this product or service as a percent of the total other products and services.

EXHIBIT VI-2

Leased Telecommunications
Top Three Other Products/Services, 1987-1988

Rank	Product/Service Mode	Percent of Total Bundled Segments
1	Communications Security Equipment and Computers	23
2	Maintenance/Repair of Aircraft	19
3	Lease/Rent of Communications Equipment	18

In the bundled market, communications security equipment and computers accounted for the greatest percentage. Note that in INPUT's previous report, communications security equipment and computers represented only 9% of the total. This suggests increasing emphasis on security of communications and computing services.

The next two most popular products and services purchased with leased telecommunications contracts were maintenance/repair of aircraft at 19% and lease/rent of communications equipment at 18%.

2. Telecommunications Equipment

The split between single and bundled obligations for telecommunications equipment is shown in Exhibit VI-3. In this market, single contract actions accounted for 78% of the total funding for 1987 and 1988. The

total for bundled contracts represented 22% for the same period. Note that, for the purpose of this calculation, amounts related to other obligations have been eliminated, since other obligations may not relate to telecommunications equipment. The calculation therefore directly compares the percentage of telecommunications equipment derived from single contracts and that derived from bundled contracts.

EXHIBIT VI-3

**Telecommunications Equipment
Percent Single versus
Bundled Contracts, 1987-1988**

From
Bundled
Purchases

22%

From Single Purchases

78%
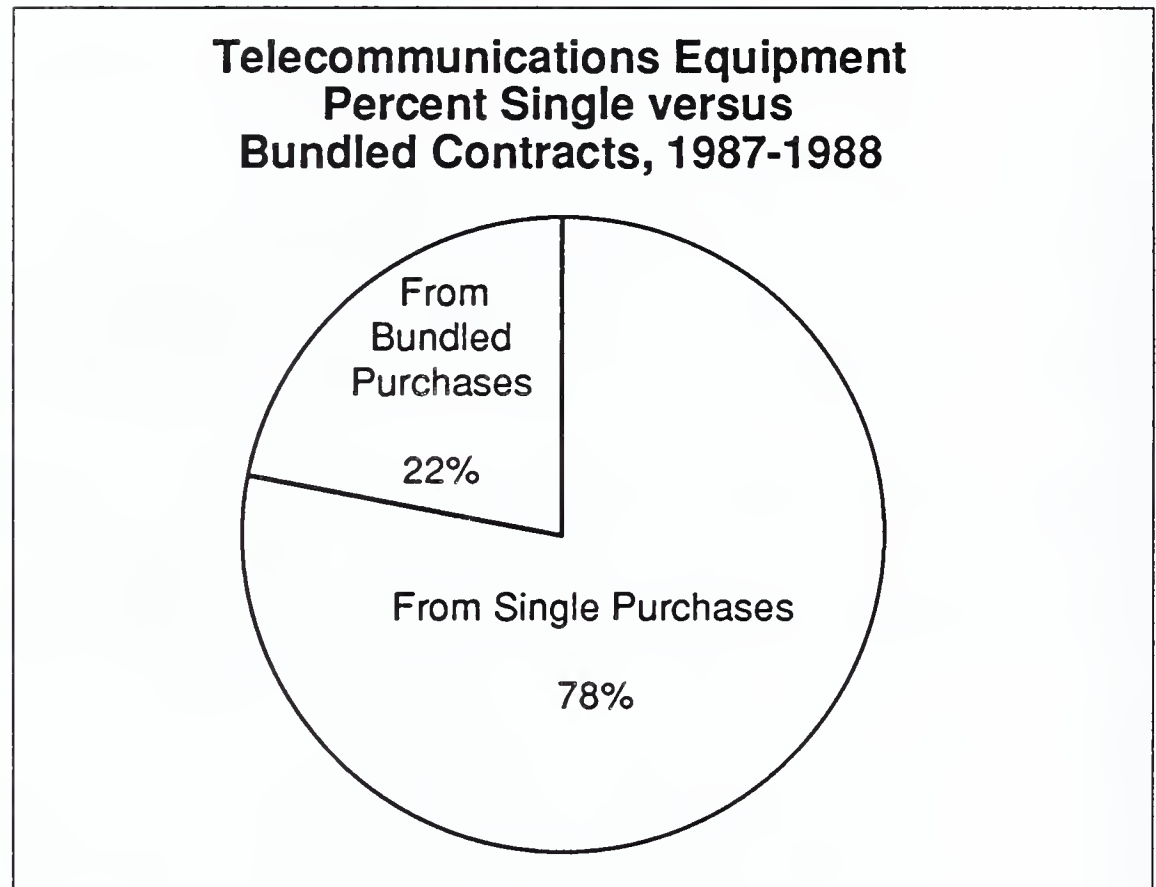
The telecommunications equipment market may be successfully approached through either contracting strategy. However, the most cost-effective method for market penetration appears to be through single contract actions.

As shown in Exhibit VI-4, in the other category, the greatest requirement was for fixed-wing aircraft equipment, representing 19% of the total of related equipment acquired under bundled contracts. This was followed by guided missile systems, 18%, and ADPE system configuration. Funding for ADPE system configuration declined from 14% in INPUT's previous report to 9% for the 1987-1988 time period.

EXHIBIT VI-4

Telecommunications Equipment
Top Three Other Products/Services, 1987-1988

Rank	Product/Service Mode	Percent of Total Bundled Segments
1	Aircraft, Fixed Wing	19
2	Guided Missile, Complete	18
3	ADPE System Configuration	9

The nature of these other items indicates that much of the telecommunications equipment acquired by the federal government is not only purchased through single contracts, but also through contracts heavily involved with aircraft avionics suites and aircraft assembly items.

3. Telecommunications Technical Support Services

Exhibit VI-5 indicates that single contract actions represent 93% of the total telecommunications technical support services obligations. Bundled contract actions account for only 7% of the funding for these services. As in other markets, single contract actions outweigh bundled contracts in their contribution to total federal contract obligations. In many instances, telecommunications technical support services are purchased through a specific contract for technical support, completely separate from contracts for other equipment and services.

Note that, for the purpose of this calculation, amounts related to other obligations have been eliminated since other obligations may not relate to telecommunications technical support. The calculation therefore directly compares the percentage of technical support derived from single contracts and that derived from bundled contracts.

EXHIBIT VI-5

Telecommunications Technical Support Percent Single versus Bundled Contracts, 1987-1988

From Bundled Purchases

7%

From Single Purchases

93%
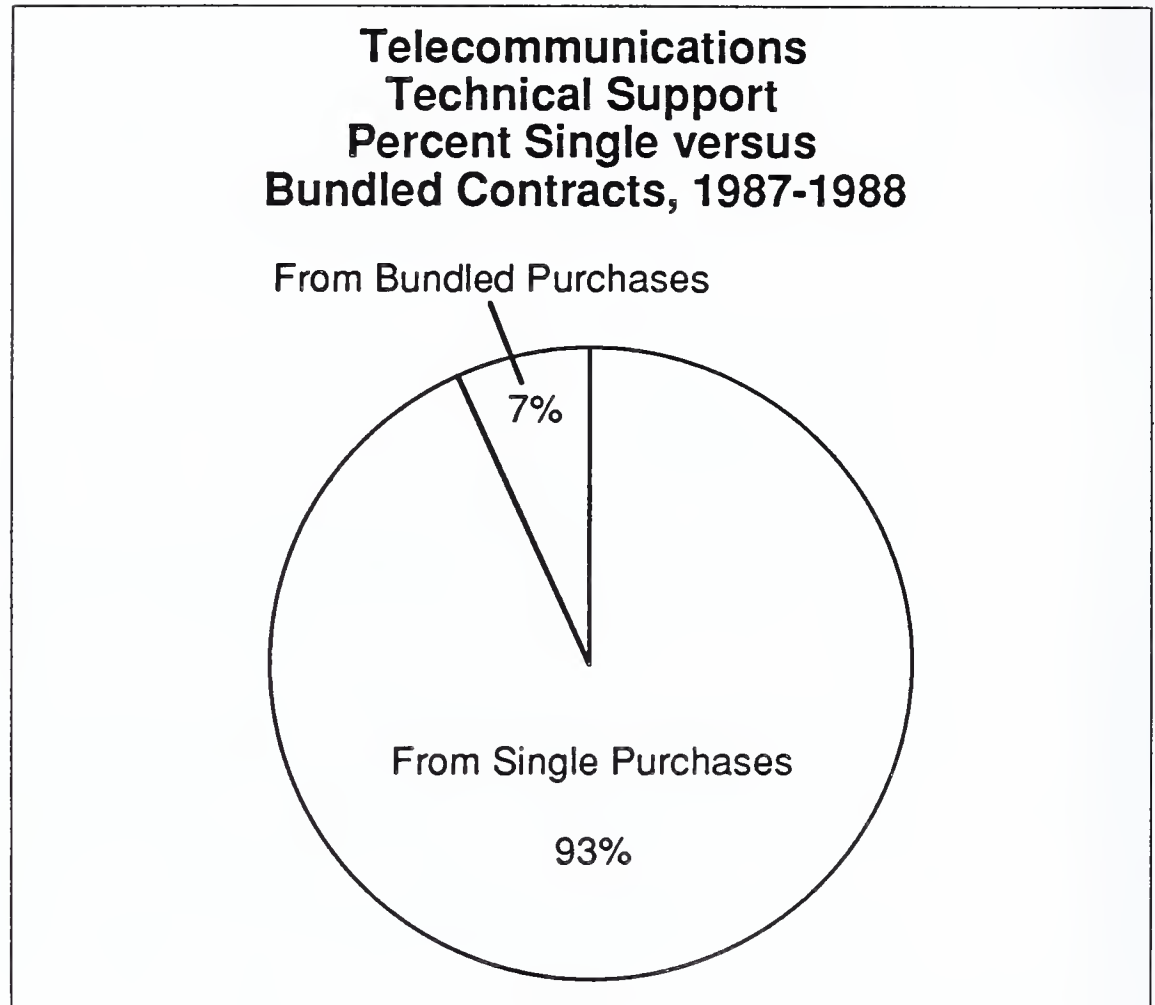
The top other category purchased as part of bundled contracts was for ADPE system configuration services, as shown in Exhibit VI-6. For the 1987-1988 time period, ADPE system configuration represented 51% of the total, as compared to 27% for the 1984-1987 time period.

EXHIBIT VI-6

Telecommunications Technical Support Top Three Other Products/Services, 1987-1988

Rank	Product/Service Mode	Percent of Total Bundled Segments
1	ADPE System Configuration	51
2	Maintenance/Repair of Aircraft	6
3	Operation of Government Missile Systems Facilities	6

Maintenance/repair of aircraft was once again in the list of other items purchased under bundled contracts. This represented 6% of the total. This was followed by operation of government missile systems facilities, also representing 6% of the total.

The high ranking of ADPE system configuration is not an oddity. It is closely related to telecommunications technical support services. However, heavy purchases of operations support for aircraft and missile facilities services show the bundled market for telecommunications technical services skewed toward contracts aimed at areas outside the scope of the market. In particular, weapons systems appear to play a major role in the market for telecommunications technical support.

4. Telecommunications Maintenance Services

Exhibit VI-7 shows the proportion of obligations for federal telecommunications maintenance services through single and bundled contract actions. Single purchases of maintenance services accounted for 75% of all obligations. Bundled contract actions represented 25% of the total.

Note that, for the purpose of this calculation, amounts related to other obligations have been eliminated since other obligations may not relate to telecommunications maintenance support. The calculation therefore directly compares the percentage of maintenance derived from single contracts and that derived from bundled contracts.

EXHIBIT VI-7

**Telecommunications Maintenance
Percent Single versus
Bundled Contracts, 1987-1988**

From Bundled Purchases

25%

From Single Purchases

75%
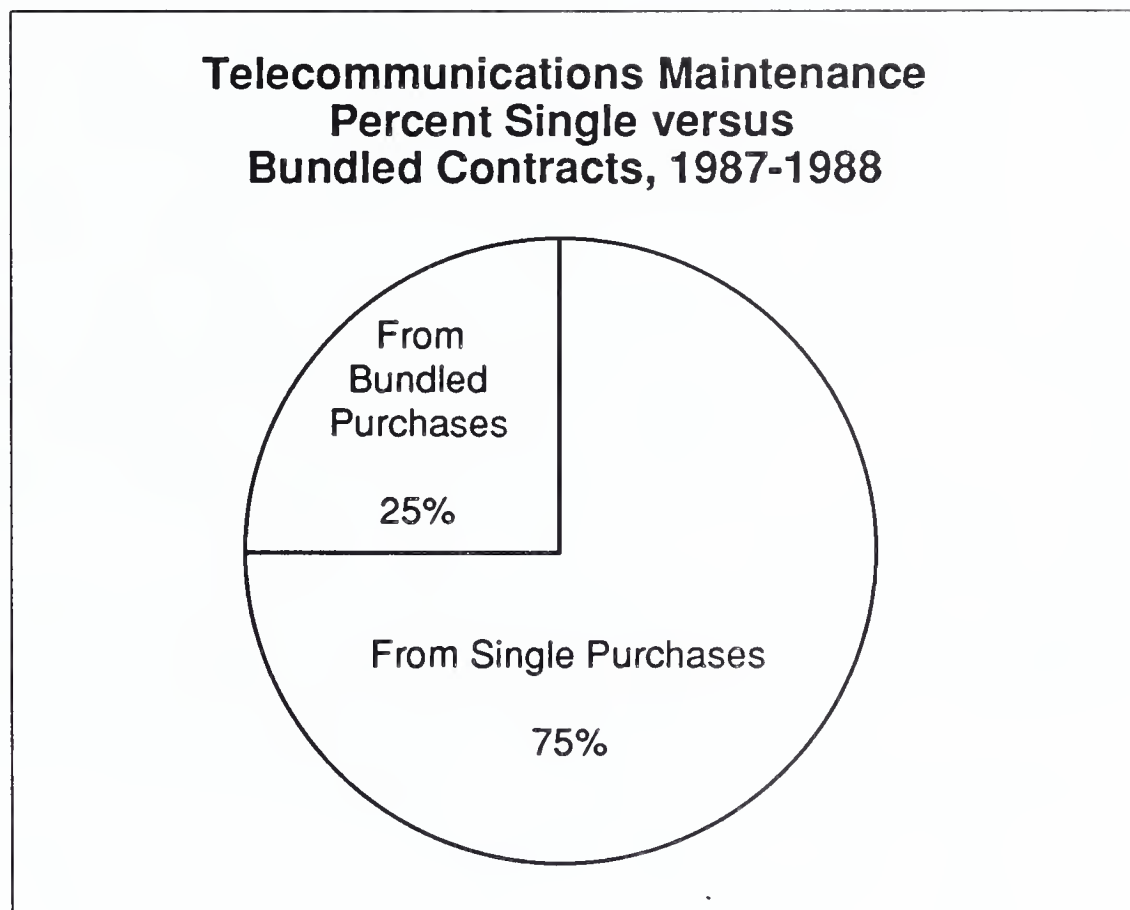
As in other markets, single contracts represent the most cost-effective method of providing telecommunications maintenance services to the federal government. Such a low proportion of funding for single contracts may be related to the wide variety of telecommunications equipment that is purchased with maintenance services included. Nonetheless, the high percentage of single contract obligations also allows vendors to enter this market not through an equipment sale, but through a maintenance sale, either for their own equipment, or as a third party.

Exhibit VI-8 shows the percentage of federal obligations that were spent on the top three other products and services in bundled contracts. The top category in bundled contracts was for fixed-wing aircraft maintenance, representing 58% of the total. This was followed by maintenance of airborne radar equipment (7%) and the provision of miscellaneous aircraft accessories and components.

EXHIBIT VI-8

Telecommunications Maintenance
Top Three Other Products/Services, 1987-1988

Rank	Product/Service Mode	Percent of Total Bundled Segments
1	Aircraft—Fixed-Wing	58
2	Radar Equipment—Airborne	7
3	Misc. Aircraft Accessories/ Components	4

This collection of other service categories indicates that the government purchases a wide range of services through telecommunications maintenance contracts. Many of the contracts have little direct relationship to the maintenance of telecommunications equipment.

B
Federal Telecommunications Vendors

Each of the market segments for telecommunications contains its own unique set of competing vendors and top performers. The following sections discuss the performance of the top five telecommunications vendors in each federal government market segment for fiscal years 1987-1988.

1. Leased Telecommunications Market

The leased telecommunications market segment includes all services included under Federal Supply Code S113. This supply code refers specifically to utilities, telephone and/or communications.

Within the segment, vendors of services under single-service contracts sell only S113 services. Vendors of bundled services sell some S113 services as well as a broad range of other products or services that may be included under a single contract.

As shown in Exhibit VI-9, the top vendor for leased telecommunications services has been AT&T for the past two years, with an average market share of 38%. However, this represents a reduction from AT&T's previous share of 44% for the period 1984-1987.

EXHIBIT VI-9

**Top Five Vendors and
Market Shares
Leased Telecommunications
Fiscal Years 1987-1988**

All Other 37%

AT&T 38%

5%
General Electric

6%
Bell Atlantic

6%
Contel

8%
Boeing Computer Services
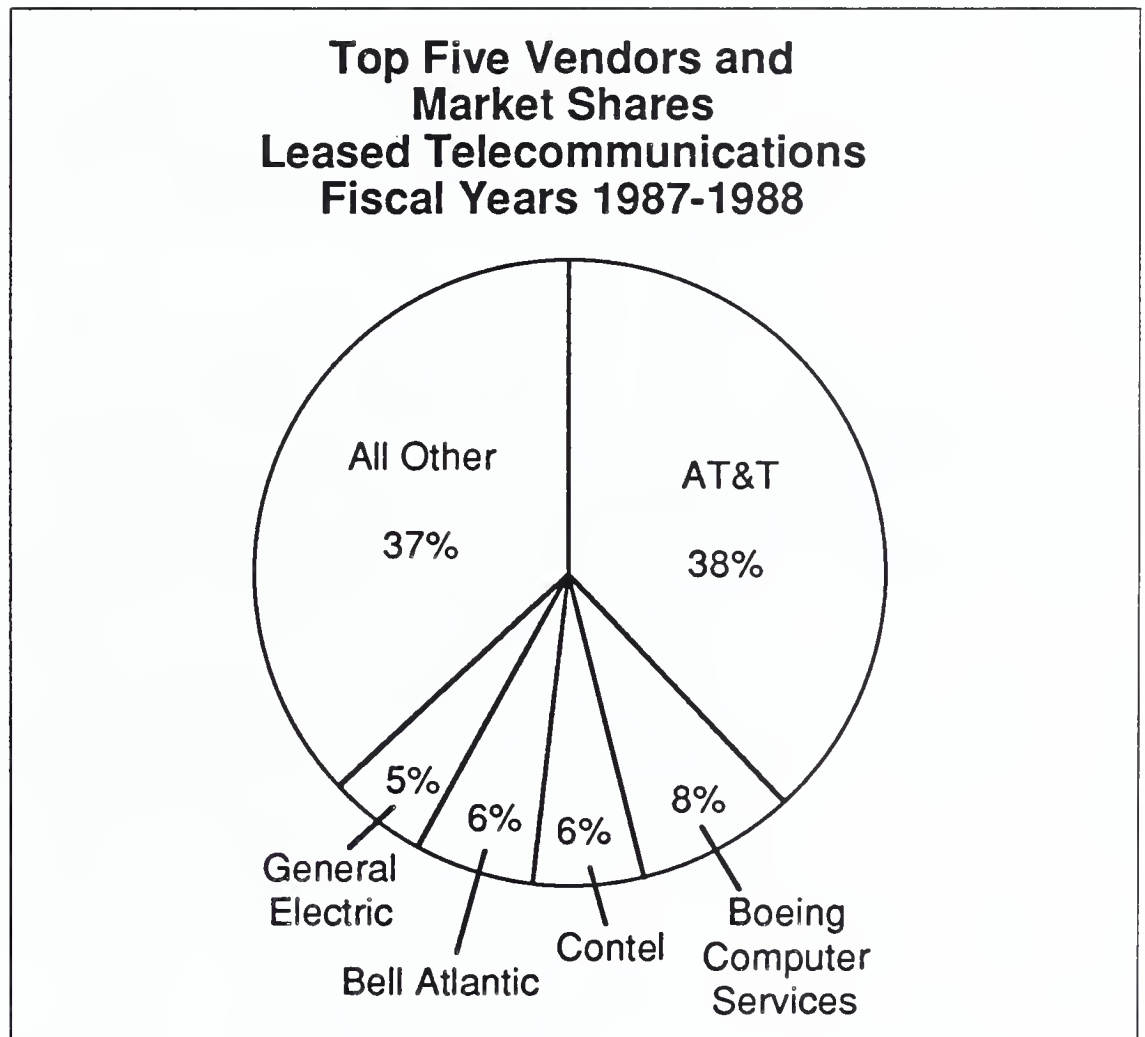
AT&T's standing as the leader is no surprise to followers of the federal leased telecommunications market. However, with the awarding of FTS 2000, AT&T's overall share of the federal market is expected to decline. Although AT&T was awarded 60% of the FTS 2000 contract, Sprint will receive a significant portion of what was formerly AT&T revenue. For

the 1987-1988 period, the reduction of AT&T's market share indicates the growing competition among long-distance service providers.

Analysis of the market for leased telecommunications services indicates two significant facts. Following AT&T, the next four market leaders account for no more than 25% of the total federal market for leased telecommunications services. The remaining 37% is divided among a wide variety of local service providers and smaller companies providing specialized services.

With the awarding of FTS 2000, the market for leased telecommunications services will be significantly controlled by two companies: AT&T and Sprint. Following AT&T and Sprint, there may be only limited opportunities. With BOCs providing the majority of local services, there may be only limited opportunities for leased telecommunications services.

The exception will be the provision of leased telecommunications services to federal departments that have been exempted from using FTS 2000. Strong competition should be expected for the provision of leased telecommunications services to the following organizations that have been exempted from use of FTS 2000 for all or part of their requirements.

- Department of Defense
- Nuclear Regulatory Commission
- Federal Aviation Administration
- Department of Energy
- Department of Veterans Affairs
- National Aeronautics and Space Administration
- Tennessee Valley Authority
- Department of Justice

The leading vendors of leased telecommunications services derive their revenue nearly equally from single and bundled contracts, as shown in Exhibit VI-10. From the data, it is clear that major providers in the telecommunications services market compete as much for single as for bundled contracts.

EXHIBIT VI-10

Top Five Vendors
Leased Telecommunications
Single/Bundled Revenues, 1987-1988

Vendor	Percent	
	Single	Bundled
AT&T	63	37
Boeing Computer Services	100	-
Contel	-	100
Bell Atlantic	38	62
General Electric	56	44

2. Telecommunications Equipment Market

The telecommunications equipment market segment includes a wide variety of Federal Supply Codes. A large number of codes is necessary to ensure complete coverage of this complex market segment. The following Federal Supply Codes are included in the federal telecommunications market.

- 5805   Telephone and Telegraph Equipment
- 5810   Communications Security Equipment and Components
- 5811   Other Cryptologic Equipment and Components
- 5815   Teletype and Facsimile Equipment
- 5820   Radio and TV Equipment, Except Airborne
- 5821   Radio and TV Equipment, Airborne
- 5825   Radio Navigation Equipment, Except Airborne
- 5826   Radio Navigation Equipment, Airborne
- 5830   Intercomm Public Address Systems, Except Airborne
- 5831   Intercomm Public Address Systems, Airborne
- 5850   Visible/Invisible Light Communications Equipment
- 5895   Miscellaneous Communication Equipment
- 5985   Antennas, Waveguides, and Related Equipment
- 5995   Cable Cord Wire Assembly - Communications Equipment
- 60xx   Fiber Optic Conductor, Cables, Assemblies, Devices, Interconnectors, and other Accessories

- 6145   Electric Wire and Cable
- 6940   Communication Training Devices

Note: In the interest of completeness, purchases relating to any of these codes have been included in the study. However, many of these products are not included as part of the total federal information technology budget (A-11 43A). INPUT bases its telecommunications market forecast on the A-11 43A document.

The leading five vendors in the federal telecommunication equipment market are shown in Exhibit VI-11. Unlike the leased telecommunications services market, the telecommunications equipment is not dominated by any single vendor. The leading vendor, GTE, holds only a 16% market share.

The leader, GTE, is followed by four vendors that, collectively, account for no more than 25% of the total market. Revenues of nearly 60% of the market are distributed across a wide variety of vendors.

EXHIBIT VI-11

Top Five Vendors and Market Shares Telecommunications Equipment, Fiscal Years 1987-1988
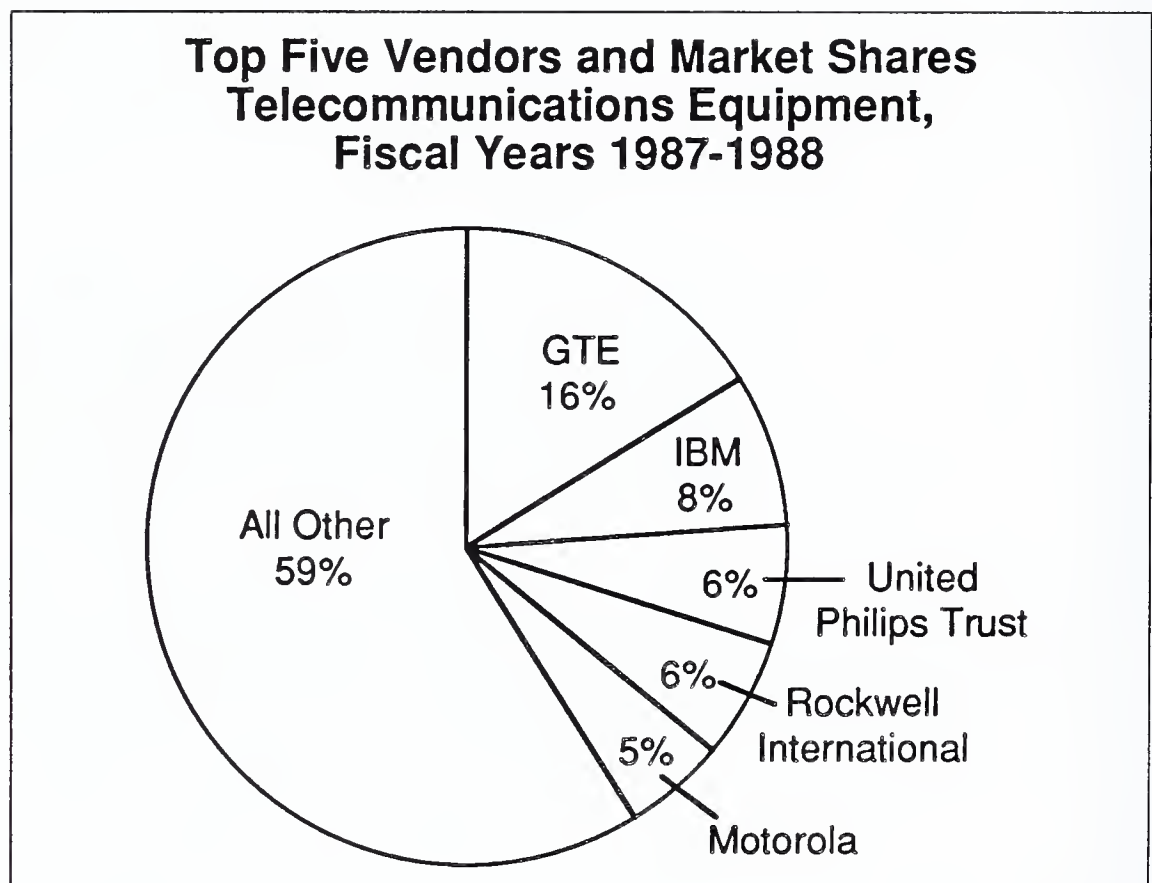
Over the next five years, new growth areas in the single telecommunications equipment market will include the three following federal supply groups:

- Any related fiber optics equipment and supplies
- Facsimile equipment
- Communication security equipment

The fiber equipment and supply market will continue to grow as federal agencies begin to realize the increased capabilities of a wideband communications medium. As GOSIP protocols receive approval from the National Institute of Standards and Technology and as ISDN capabilities become a popular method of information transmission, the federal government will be pressured to develop fiber optic capabilities to keep pace.

The need for security equipment is growing steadily, commanding 17% of the federal obligations for communications equipment. This percentage has increased from 9% in INPUT's previous report. As increased numbers of large, sophisticated communications networks become commonplace in the federal government, requirements for communications security equipment will increase.

Exhibit VI-12 summarizes the percentage of revenues that each of the leading five vendors receive from single and bundled contracts. The data indicates that single contracts are the preferred method of entering into equipment contracts. However, the fact that the leading five vendors receive only 40% of the revenues for telecommunications equipment suggests that there is ample opportunity for vendors of equipment to meet specific needs.

EXHIBIT VI-12

Top Five Vendors
Telecommunications Equipment
Single/Bundled Revenues, 1987-1988

Vendor	Percent	
	Single	Bundled
GTE	85	15
IBM	100	-
United Philips Trust	25	75
Rockwell International	75	25
Motorola	73	27

INPUT believes that growth areas for telecommunications equipment will be the following:

- Fiber optics equipment and supplies
- Facsimile equipment
- Communications security equipment

However, since many of these products are included as part of bundled contracts, their purchase will originate from contracts "related" to telecommunications equipment. In other cases, the focus of the contract may not be telecommunications equipment at all. These related (and unrelated) contracts allow vendors without strong telecommunications equipment capabilities, especially in the areas listed above, to enter the market through other means.

3. Telecommunications Professional Services: Telecommunications Maintenance Services and Technical Support

For this analysis, the telecommunications professional services market includes data from two services segments: telecommunications maintenance services and telecommunications technical support. As in other market segments, the professional services segment includes a wide variety of Federal Supply Codes.

Telecommunications maintenance services include:

- H158   Quality Control of Communications Equipment
- H258   Equipment Test Services
- H358   Inspection Services
- J058   Maintenance and Repair of Communications Equipment
- J060   Maintenance and Repair of Fiber Optics Materials and Equipment
- K058   Modification of Communications Equipment
- L058   Technical Representative Services: Communications
- N058   Installation of Communications Equipment

Telecommunications technical support includes:

- M127   Operation of Government Electronic and Communications System Facility
- R304   ADP Services and Data Transmission
- R426   Professional Services: Communications Services
- R553   Communications Studies
- Y127   Construction of Electronic and Communications Systems and Facilities
- Z127   Maintenance, Replacement, and Alteration of Electronic and Communication System Facilities

Also, like other segment analyses, both of these segments will be further broken into single and bundled markets. Taken as a set, the single and bundled telecommunications maintenance market and the single and bundled telecommunications technical support market will make up the telecommunications professional services segment of this report.

a. Telecommunications Maintenance Services Market

As shown in Exhibit VI-13, two vendors—AT&T and IBM—share the top ranks of the single telecommunications maintenance services market. These cover contracts that involve at least one of the FSCs above and are primarily single contracts.

EXHIBIT VI-13

**Top Five Vendors and Market Shares
Telecommunications Maintenance
Fiscal Years 1987-1988**

- IBM 12%
- AT&T 11%
- Ford Motor 7%
- 4% Tracor
- 4% Northrop
- All Others 62%
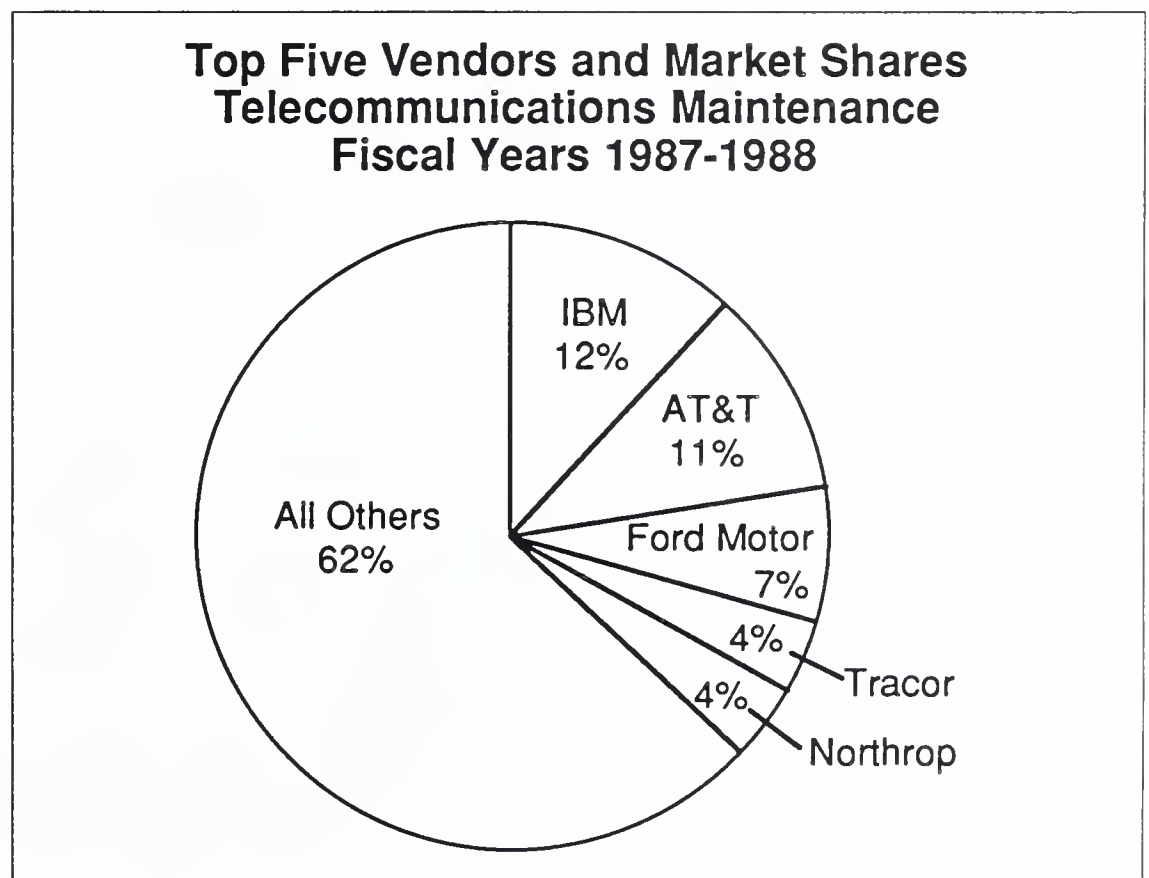
As can be noted from the exhibit, there are many vendors providing professional services. For the 1987-1988 period, the five leading vendors constituted only 36% of the total market.

Aside from the consistent performance of AT&T, IBM and Ford Motor, many vendors frequently show only once or twice. In fact, of the ten different vendors who ranked in the top five over the past five years, half appear only once. These four one-year showings were made by Raytheon in 1984; General Electric in 1985; and Allied Signal and SAIC in 1987.

Such a high rate of vendor appearances in only one year may indicate a highly competitive and volatile market, in which a comparatively few

awards can change the top rankings from year to year. IBM's high revenues from telecommunications maintenance most likely involve subcontracting and OEM activities in areas such as maintenance and repair of communication equipment, technical representative services, or even installation of communications equipment. In the future, the most successful vendors in this market will be those that are able to translate contracting activity in related telecommunications areas into follow-on maintenance contracts for the subsequent years.

Like the telecommunications equipment market, vendors in the telecommunications maintenance market derive the majority of their revenues from single contracts, as shown in Exhibit VI-14. In total, approximately 78% of the revenues of the top five vendors are derived from single contracts.

EXHIBIT VI-14

Top Five Vendors
Telecommunications Maintenance
Single/Bundled Revenues
1987-1988

	Percent	
Vendor	Single	Bundled
IBM	70	30
AT&T	100	-
Ford Motor	35	65
Tracor	96	4
Northrop	87	13

b. Telecommunications Technical Support Market

The second segment included in the telecommunications professional services market covers contracts for telecommunications technical support. The Federal Supply Codes included in this section are listed at the opening of the professional services section.

The top vendors for the telecommunications technical support segment are listed in Exhibit VI-15. Again, these vendors have received revenues only for products listed in the FSCs above for technical support.

The uncontested leader in this market for single telecommunications technical support is the airline Pan Am. This leadership is partly explained by the fact that Pan Am has subsidiaries such as TGS Technology, Inc. and Pan American Electronics, Inc., which are apparently becoming increasingly involved in the federal telecommunications technical support market.

EXHIBIT VI-15

Top Five Vendors and Market Share
Telecommunications Technical Support
Fiscal Years 1987-1988

Pan Am Corp 37%

All Others 40%

5%
5%
5%
8%

Dynacorp

Calculon Corp

Bechtel

General Electric
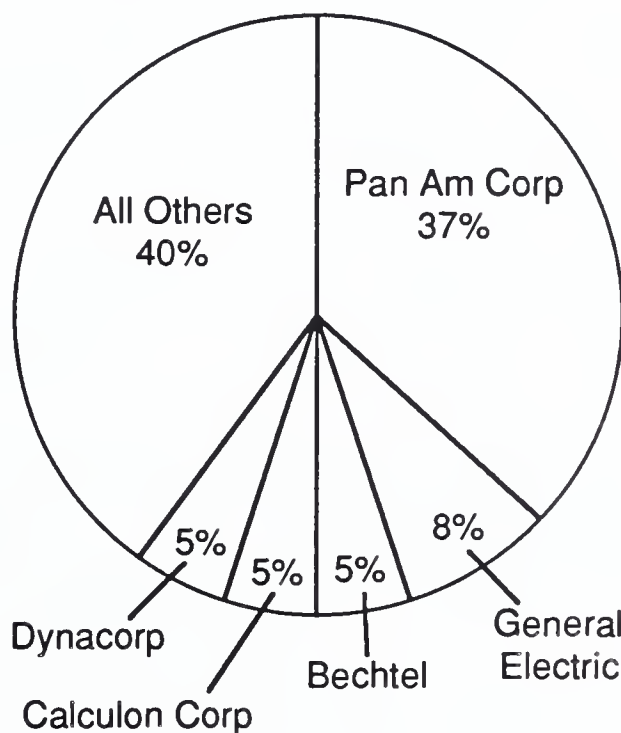
Following Pan Am, leading vendors in providing telecommunications technical support hold only small shares of the market. Forty percent of the market is divided among many smaller vendors, each providing specialized support for specific products or meeting specific market needs.

Continuing the trend of telecommunications equipment and maintenance, the leading vendors receive the majority of their revenues from single contracts, as shown in exhibit VI-16.

EXHIBIT VI-16

Top Five Vendors
Telecommunications Technical Support
Single/Bundled Revenues, 1987-1988

	Percent	
Vendor	Single	Bundled
Pan Am Corp.	100	-
General Electric	98	2
Bechtel	100	-
Calculon Corp.	100	-
Dynacorp	25	75

C
Vendor Federal Telecommunications Market Plans

The following discussion examines the factors that can affect the success of a vendor in the federal telecommunications market.

1. Market Direction

The market for telecommunications services will continue to grow. As shown in Exhibit VI-17, 62% of vendors believe that the market for telecommunications services will continue to grow. Only 8% think that it will decline.

EXHIBIT VI-17

Vendor Perception of Federal Telecommunications Market Directions

Decreasing 8%

Don't Know 8%

Remaining the Same 23%

Increasing* 62%

*Average increase indicated: 19%.
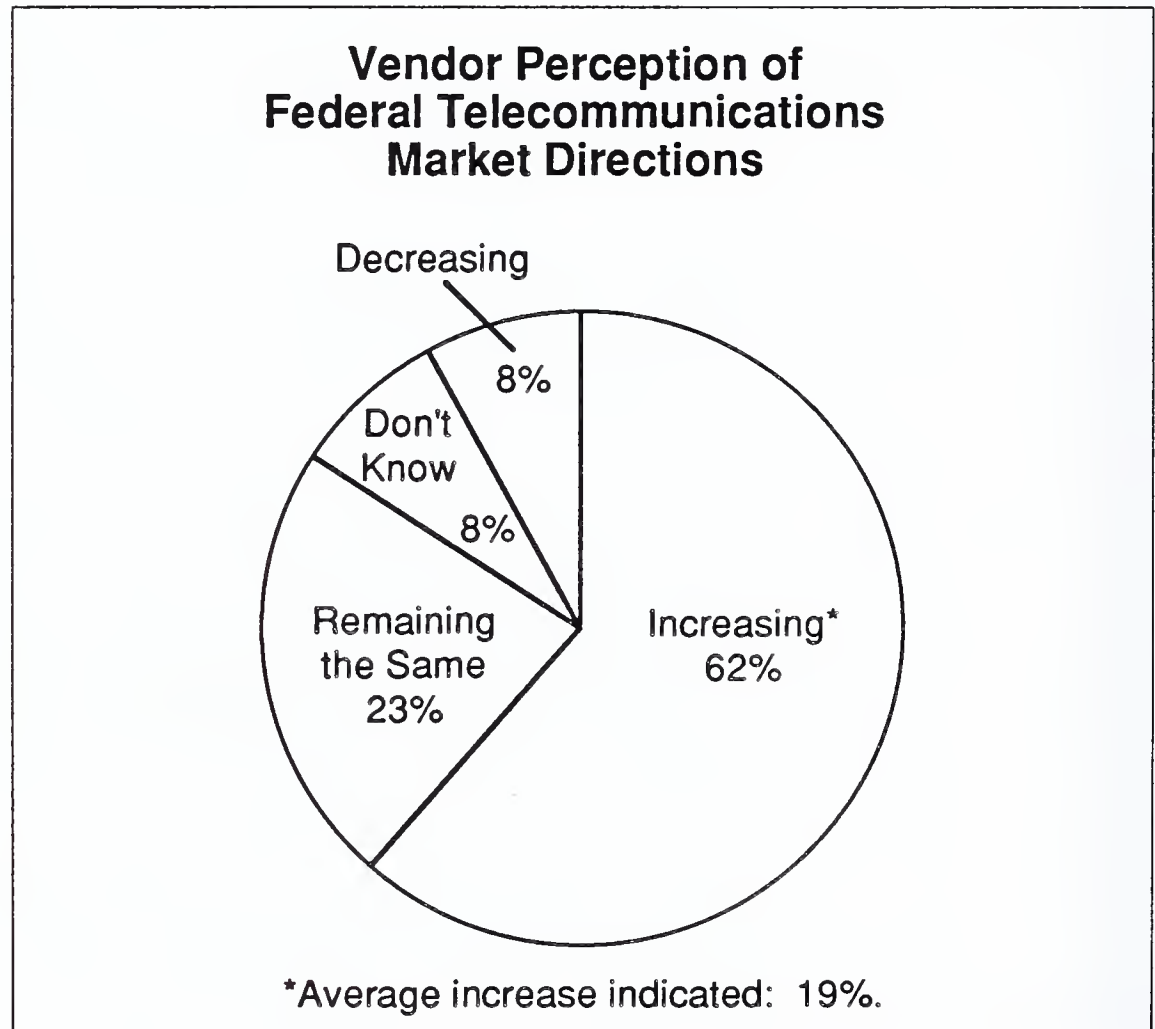
The rate of growth is open to question. Agencies are generally not able to predict the rate of growth. Vendors believe that the market will grow at 19% for the next several years. Though agencies were not able to identify a specific growth rate, they believe that the primary growth will occur in several areas.

- 42% of the agencies believe that spending for voice services will increase. However, an equal number believe that spending for voice services will decrease. The remainder believe there will be no change.

- 73% of the agencies believe that spending for leased circuits will increase. Only 18% believe that spending will decrease.

- 80% of the agencies believe that spending for value-added network services will increase. None think that spending for value-added network services will decrease. The primary requirement for value-added network services is for electronic mail. On a scale of 1-5, with 1 being low, users rate the importance of electronic mail at 4.3, suggesting that electronic text communications is important to nearly all agencies.

- 78% of the agencies believe that spending for hardware will increase. None think that spending will decrease.

- 78% of the agencies believe that spending for software will increase. Only 11% think that spending will decrease.

2. Growth Factors

There are several factors that will cause growth in the federal market for telecommunications. Vendors identified eight different factors that they believe will cause the market to grow. Of the eight factors, specific agency requirements was the most frequently mentioned, by a considerable degree.

As shown in Exhibit VI-18, overall growth in network use, the availability of new technology, and standards integration were perceived by vendors to be considerably less important.

EXHIBIT VI-18

Vendor Perceptions of Market Growth Factors

Market Drivers	Percent of Responses*
Specific Agency Requirements	46
Increasing Network Use	19
New Technology Availability	19
Standards and Protocols Integration	19
General Automation Increases	9
Aging Equipment Upgrades	9
FTS 2000	9
Cost Decreases	9

*Does not add to 100%—multiple responses allowed.

3. Agency Opportunities

As vendors consider opportunities for telecommunications products and services within the federal government, the Department of Defense continues to head the list as offering the greatest opportunities. While vendors rate civilian agency opportunities comparably, there are a greater number of civilian agencies. Exhibit VI-19 summarizes the vendors' perception of the departments and agencies that offer the greatest opportunities.

EXHIBIT VI-19

Agencies Offering the Most Telecommunications Opportunities

Agencies	Percent of Responses*
DoD	36
Civil	36
Transportation/FAA	27
Agriculture	18
NASA	18
Treasury	18
Security/Intelligence	18
U.S. Postal Service	18
GSA	18
State	18
Air Force	9
Navy	9
HHS	9
Justice	9
Energy	9
EPA	9

*Does not add to 100%— multiple responses allowed.

4. Preferred Acquisition Methods

As shown in Exhibit VI-20 , there is considerable difference of opinion between vendors and agencies about the preferred method of acquiring telecommunications services. (Responses for this exhibit resulted from a question about the preferred method of acquiring telecommunications services—*if given free choice*. The requirement to use FTS 2000 was

noted to respondents. They were asked to provide their opinion, assuming that use of FTS 2000 was not a requirement.)

From the responses, several points become clear.

EXHIBIT VI-20

Vendor Perceptions of Agency Preference for Acquiring Telecommunications Systems and Services

Acquisition Preference	Ranking*	
	Vendor	Agency
Buy Integrated Systems	1	1
Buy VAN Services	2	4
Vendor Integrate Agency-Bought Components	3	5
Use GSA or DCA Facilities	4	3
Buy Common Carrier-Provided Services	5	2
Agency Buys Components and Integrates In-house	6	6

*Rank based on average ratings by respondents.

For a variety of reasons, primarily related to staffing, most agencies have no desire to develop and integrate telecommunications. Both vendors and agencies rate this method of acquisition at the bottom of the list.

Vendors and agencies agree that buying integrated systems would be the preferred method of meeting agency needs, if agencies had a free choice. While vendors and agencies agree on the most and least desirable method of acquisition, there is considerable difference of opinion about other options.

The ranking of preferred methods suggests strongly that agencies prefer to buy services from common carriers rather than value-added network service providers. Vendors perceive that the opposite is true.

Vendors and agencies rate the use of GSA or DCA-provided facilities nearly equally. However, the opinion of agencies has changed somewhat over the past two years. In INPUT's previous report, agencies ranked the use of GSA or DCA facilities as fifth out of the six categories. The change suggests confidence that FTS 2000 will better meet agency requirements.

5. Critical Technologies

As evidenced by agency and vendor ratings of the importance of a wide variety of technologies, federal agencies believe that they have specific needs and little interest in the application of wide-ranging technologies. As indicated in Exhibit VI-21, vendors believe that the most critical technology need is for local-area networks. Systems to manage these networks follow closely in the rankings.

EXHIBIT VI-21

Vendor Ranking of Criticality of Telecommunications Technologies

	Rank*	
Technology	Market Today	By 1995
LANS	1	1
Network Management Systems	2	1
Electronic Mail	3	4
EDI	4	3
VAN Services	5	7
Satellite Networks	6	8
VSAT Networks	7	6
ISDN	8	5
Cellular Telephones	9	9

*Based on average ratings by respondents: 1 - 5 scale, where 5 = extremely critical, and 1 = not critical at all.

Neither agencies nor vendors consider cellular telephones, ISDN, VSATs, or satellite networks to be of great importance. ISDN will grow in importance over the five-year period, but not to a great extent. Local-area networks are very clearly important. They will become increasingly important over the next five years.

6. Standards

Vendors and federal agencies agree that the federal government should migrate toward the use of OSI standards for telecommunications protocols. In support of this move, the National Institute of Standards and Technology (NIST) adopted a set of internationally recognized communications protocols as the Government Open Systems Interconnection Profile (GOSIP) standard.

The NIST spent nearly two years developing GOSIP as a federal information processing standard (FIPS). According to the institute, the GOSIP profile will include the message-handling systems, file transfer, access, and management applications of the International Standards Organization's Open Systems Interconnection (OSI) standards. This set of protocols will operate in four network environments: X.25, Carrier Sense Multiple Access with Collision Detection (CSMA/CD; IEEE 802.3), Token Bus (IEEE 802.4), and Token Ring (IEEE 802.5).

Because of the support for GOSIP, the full OSI reference model and associated standards are expected to continue to gain vendor support during the next five years. Nearly all vendors providing telecommunications products and services to the federal government will expand their product support of OSI protocols, add OSI product support, or maintain the coverage they offer.

Even vendors with a strong commitment to proprietary protocols are responding to the federal trend toward OSI. IBM and Digital Equipment Corporation have both committed to support of OSI and are active participants in NIST-sponsored OSI activities.

In another telecommunication protocol development, the major standards organizations have been gradually moving toward agreement on architectures for network and LAN management. Groups within the IEEE 802 committee are developing protocols for LAN management which will fit into the layered OSI model. These protocols do not entirely agree with the same work done by the ISO, but industry representatives are working on convergence of these network protocols.

To ensure support for OSI and GOSIP, NIST is sponsoring demonstrations of OSI-based MAP/TOP systems. The institute is coordinating vendor activities on a project called OSINET, which provides vendors with a testbed X.25 network for developing, testing, and demonstrating

OSI protocols and products. This network was provided by AT&T and Wang. As a result of their workshop and demonstrations, NIST issued the "Implementation Agreements for Open Systems Interconnection Protocols" (NISTIR-86-3385-4).

Communications protocol conformance has become an important marketing tool in developing products and services that reflect users' demand for products that implement common standards. Both industry and government see the need to continue to coordinate their efforts in protocol and standards development.

D
Vendor Concerns

In discussing the federal telecommunications market, vendors voiced several concerns about federal organization, staffing, and procurement practices.

1. Federal Organization and Staffing

Vendors continue to express frustration with government progress toward integrated voice and data communications management. Although each agency's Office of Information Resources Management (OIRM) is chartered to manage both data and voice communications, necessary organizational changes have been made only recently.

Because of this confusion, vendors have had difficulty determining exactly which office or offices are responsible for telecommunications requirements and initiatives. In some cases, where agency voice and data communications are acquired and managed separately, vendors continually receive contradictory information about long-range telecommunications plans.

Vendors recognize that most agencies are still lagging behind industry in telecommunications expertise. Vendors also perceive that, as a result of this lag, many federal RFPs, live test demonstrations, and benchmarks contain terms, conditions, and specifications that are inappropriate for modern telecommunications systems. On the other hand, agencies with strong in-house telecommunications expertise tend to overspecify solutions and standards, rather than state requirements and let vendors bid appropriate technical solutions.

2. Vendor Improvements to Products and Services

Vendors were asked what practices and services they believe vendors should change or improve over the next five years to make their products and services more valuable to the federal government. Replies varied, correlating to the different types and degrees of experience the vendors have encountered with federal agencies. Although the responses varied, there was a consistent theme.

As shown in Exhibit VI-22, vendors believe that there is a need for general technical and product education. Following this, other considerations are of considerably less importance. Agencies agree with the need to provide technical and general education. Ensuring that agency staff have up-to-date information about technology trends was the most frequently mentioned need by agency respondents.

EXHIBIT VI-22

Vendor Suggestions to Improve Responsiveness to Federal Telecommunications Needs

Suggestions	Percent of Responses*
Provide More General Technical and Product Education	40
Present Products Honestly	10
Provide Flexible Services	10
Develop More Specialized Products	10
Offer Creative Solutions	10
Fully Support Configurations	10
Network within the Government	10
Understand Regulations	10
Participate in Policy Making	10

*Does not add to 100%; multiple responses allowed.

3. Factors Affecting Government Spending

Vendors surveyed by INPUT suggested several factors that could increase or decrease federal government spending on telecommunications products and services over the next two to five years. As shown in Exhibit VI-23, the most significant factor will be the availability of FTS 2000.

EXHIBIT VI-23

Significant Factors That Will Affect Federal Use of Telecommunications Services through 1995

Factors	Rank*
FTS 2000	1
Increased Use of New Technology	2
Increased Use of PC-Based Distributed Processing	3
Budget Problems	3
Network Management	3

*Based on frequency of mention by respondents.

In INPUT's previous research, budget changes were considered the most significant factor. In this year's research, budget problems (changes) were ranked closer to the bottom of the list. INPUT believes that the primary reason for the shift is the availability of FTS 2000.

Until the availability of FTS 2000, agencies were required to place greater emphasis on the development of their own networking solutions. In addition, agencies were waiting to see what services would be included in FTS 2000, before moving ahead with their own plans. Since FTS 2000 will provide many services not previously available, many agencies will move ahead with plans to improve their telecommunications services.

4. Agency-Required Actions

Selling to the federal government is a lengthy and difficult process. Vendors believe that the government should take a number of actions to improve their use of telecommunications services. As shown in Exhibit VI-24, shortening the procurement cycle is the most frequently mentioned action.

EXHIBIT VI-24

Government Actions to Use Telecommunications More Effectively

Actions	Rank*
Shorten Procurement Cycle	1
Integrate Requirements and Solutions in More Umbrella Contracts	1
Improve Technical Expertise	3
Improve Technical Communications with Vendors through RFI and Draft RFPs	3
Share Technology and Technical Resources between Agencies	3

*Rank based on frequency of mention.

Following the change in procurement procedures, vendors believe that agencies would benefit from defining more umbrella contracts from which agencies could select solutions that would meet their needs.

E
INPUT Recommendations

Telecommunications vendors need to invest more time and effort in understanding agency missions and related communications requirements. Vendors need to be aware that in the federal contracting environment, there are many acquisitions that support multiple missions.

Further, there are other acquisitions supporting several parts of an agency with diverse functions. These sorts of acquisitions cover numerous requirements under one contract, which ultimately limits the number of telecommunications opportunities in that agency. An understanding of unstated constraints and future federal directions is essential to a successful bidding strategy. Recommendations are summarized in Exhibit VI-25.

Vendors can assist agencies in preparation of better solicitations while improving their own strategic positions. To assist the federal government, vendors could offer briefings or seminars on key technical issues and regularly respond to agency Requests for Information (RFIs) and Statements of Work. Vendors might also send technical bulletins to agency management, technical, and contracting officials.

EXHIBIT VI-25

Recommendations to Vendors

- Understand Agency Requirements

- Offer Briefings/Seminars

- Focus on Long-Term Solutions

- Emphasize Corporate Stability

- Strengthen After-Sale Support

- Strengthen Alliance Positions

- Focus on Interoperability

- Develop OSI/GOSIP Models

Vendors should emphasize comprehensive, lasting solutions to agency telecommunications requirements. Single-vendor proposals for federal telecommunications programs must also address numerous agency concerns.

Among these agency concerns, vendors should include mention of long-term compatibility and expendability of the proposed system, and the potential for integration of voice/data communication. Vendors should emphasize corporate stability and a commitment to the telecommunications market. Finally, vendors should be aware of potential for additional revenues from continuation of services after award and implementation, particularly for communications hardware.

Vendors wishing to enter or expand their share of the federal telecommunications market face a number of significant barriers. Competition in the federal market requires considerable presolicitation investment. Also, many new federal telecommunications systems have been acquired within the last few years, with projected system life cycles of five to ten years. Further, development of attractive new telecommunications products and services is costly in terms of capital investment and qualified personnel.

To overcome these barriers, and ultimately save valuable time and money, vendors should investigate alternative strategies for new-product development. Newer or smaller companies should develop teaming or

subcontracting relationships with larger, more experienced federal telecommunications vendors, concentrating on vendors active in systems integration.

Vendors should also target new products and services for specific growth areas of interest of the federal government. These areas include intercon- nection and interoperability of existing hardware and teleconferencing facilities. Other growth areas include professional services, such as training and system design, management, and maintenance.

Vendors should develop products and services around the OSI and GOSIP models to meet future federal requirements. Participation in NIST-sponsored OSI activities also presents a cost-effective approach to research and development.

Telecommunications hardware vendors must be watchful of current federal buying trends. They must be prepared to supplement their rev- enues beyond FY 1990 by providing additional enhancements and services for systems acquired in the mid- to late-1980s.

Innovative products and services will be needed to realize a measurable federal market share.

VII
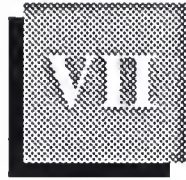
Telecommunications Opportunities

This section describes specific opportunities in the federal information technology market. Lists of programs are provided for future telecommunications and related services. The opportunities list consists of major programs that are typical of the federal market and serves as a representative sample.

A
Present and Future Programs

Funding for telecommunications is provided in several budget categories of federal government agencies. New information technology programs, including telecommunications acquisitions that are larger than $1 - $2 million, are listed in at least one of the following federal government documents:

- OMB/GSA/NIST Five-Year Plan, which is developed from agency budget requests submitted in compliance with OMB Circular A-11

- Agency long-range information resource plans developed to meet the reporting requirements of the Paperwork Reduction Act of 1980

- Agency annual operating budget requests submitted to both congressional oversight and appropriations committees based on the OMB A-11 information

- *Commerce Business Daily* notice of specific opportunities—for qualification as a bidder and for requesting a copy of an RFP or RFC

- Five-Year Defense Plan, which is not publicly available, and the supporting documentation of the separate military departments and agencies

Telecommunications opportunities may or may not be specifically identified as such in the following documents:

- Information technology planning documents usually identify mission requirements to be met by specific programs, rather than methods for meeting these requirements

To add to the difficulty of identifying planning telecommunications buys, most medium and smaller buys (valued at less than $1 million) are rarely identified in agency budget documents.

All funding proposals are based on cost data of the year submitted, with inflation factors dictated by the Administration as part of its fiscal policy, and are subject to revision, reduction, or spread to future years in response to congressional direction. Some additional reductions will be likely in fiscal 1991 and beyond, due to the deficit reduction constraints of the Gramm-Rudman-Hollings Act.

B

Recent Telecommunications Awards

Although the following programs may require other products or services, they all include telecommunications support.

Agency/Program Reference		Contractors	Value ($ Millions)
Defense - Army			
Corp of Engineers (COE)	Support for LANS	Federal Information Technology	4.8
Corp of Engineers (COE)	Corps of Engineers Automation Plan; Objective/(CEAP-1B)	CDC/AT&T	365.0
	Communications Equipment	E Systems	4.3
Defense - Air Force			
Defense Supply Service	Binary Synchronous Network for DMS Support Centers	Contel/MCI	67.0
AFCAC	AF Accounting and Finance Center LAN	Computer Systems & Resources	6.0

Agency/Program Reference		Contractors	Value ($ Millions)
Defense - Army			
AFCAC	Communications Switching System	Communication Systems Technology Inc.	23.8
	Communications Equipment	Contel	41.1
Defense - OSD	Office Automation and LAN	Contel	86.5
Agriculture	LANs and Microcomputers	Sysorex	14.9
GSA	Washington Interagency Telecommunications System (WITS)	C&P Telephone	282.1
HHS/SSA	LANs	Network Management	4.9
Interior			
USGS	Distributed Information System II (DIS II)	Data General	127.0
Justice	Voice and Data Telecommunications Systems and Associated Services	C&P Telephone	90.0
Transportation	Telecommunications Engineering Analysis and Communication Network Planning	RMS Technology	20.2
Treasury	Voice and Data PBX	AT&T	90.0
U.S. Mint	Distributed Information Systems Network	Sysorex	15.0
Veterans Affairs	Integrated Data Communications Utility (IDCU)	SAIC/Telenet	84.0

C

Telecommunications Opportunities by Agency

Program	PAR Number	RFP Schedule	Funding FY90-FY95 ($ Millions)
Air Force			
Air Force WWMCCS ADP Modernization	V-1-27	Various	163.7
Joint Uniform Services Technical Information System (JUSTIS)	V-1-53	Unk	Unk
Air Force CALS	V-1-108	Various	Unk
Survivable Base Recovery After Attack Communications Systems	V-1-120	4QFY90	Unk
Joint Staff Automation into the Nineties	V-1-126	4QFY90	Unk
Army			
Army WWMCCS Information System	V-2-8	4QFY90	Unk
Acquisition Information Management Program	V-2-39	Unk	Unk
Military Construction Programming Administration and Execution	V-2-48	FY92	Unk
Medical Diagnostic Imaging Support System (MIDS)	V-2-50	4QFY90	Unk

Program	PAR Number	RFP Schedule	Funding FY90-FY95 ($ Millions)
Navy			
Personnel and Pay System Consolidated Computer Center Program (PERSPAY)	V-3-11	1993	26.4
CAD/CAM II	V-3-14	Various	82.0
Navy CALS	V-3-80	Various	Unk
Navy WWMCCS ADP Modernization	V-3-83	Unk	65.8
Ship Service Telephone System	V-3-102	FY90	Unk
Defense			
Defense Automatic Addressing System ADPE Replacement Program	V-4A-4	1/1/91	9.3
Defense Enrollment Eligibility Reporting System	V-4E-2	FY92	31.0
Agriculture			
Agricultural Communications Network	VI-5-28	9/90	3.7
Integrated Systems Acquisition Project	VI-5-34	4QFY90	Unk
Laboratory Information Management System	VI-5-35	4QFY90	Unk
Commerce			
Data Base Automation	VI-6-27	Various	319.3

Program	PAR Number	RFP Schedule	Funding FY90-FY95 ($ Millions)
Energy			
Power Control System	VI-7-57	1QFY91	Unk
National Water Information Network	VI-7-85	Unk	Unk
Private Branch Exchange Implementation	VI-7-89	FY92	Unk
Private Branch Exchange Systems	VI-7-90	12/91	2.2
Health and Human Services			
Child Support Enforcement National Communications Network	VII-8-39	4QFY90	50.0
Interior			
Bureau of Land Management ADP Modernization Project	VII-9-11	Unk	162.6
Labor			
ERISA Electric Data Base	VII-9A-2	Various	71.7
Justice			
Computer Applications Communications Network	VII-10-9	Various	242.0
Antitrust Office Automation	VII-10-17	Various	10.9
General Services Administration			
Aggregated Switch Procurement	VIII-14-21	Various	1,267.0

Program	PAR Number	RFP Schedule	Funding FY90-FY95 ($ Millions)
NASA			
Customer Data Operations System	VIII-15-62	Various	Unk
Program Support Communications Network	VIII-15-73	FY94	Unk
Environmental Protection Agency			
Telecommunications System Replacement and Modification	VIII-17-1	1QFY91	7.5
Facilities Management Primary Support Contract for the NCC and the WIC	VIII-17-7	9/1/90	Unk

VII-8
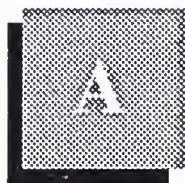
Interview Profiles

A

Federal Agency Respondent Profile

1. Contact Summary

For this study, INPUT interviewed 16 agency personnel by telephone:

- Policy Makers - 11
- Program Managers - 5

2. List of Agencies Interviewed

Department of Agriculture

National Aeronautics and Space Administration

Department of Commerce

Department of Defense
      Joint Staff

Department of Education

Export/Import Bank

Office of Human Services

Department of Interior

Department of Justice

Federal Maritime Commission

General Accounting Office

Health and Human Services

Housing and Urban Development

Interstate Commerce Commission

National Oceanographic and Atmospheric Administration

U.S. Information Agency

B
Vendor Respondent Profile

For this study, INPUT contacted a representative sample of vendors who provide telecommunications systems or services to the federal government. Job classifications among individual vendor respondents included marketing as well as administrative executives. All contacts with vendor personnel were by telephone.

1. Vendor Size and Revenue

- Average company revenue - $1,440 million
- Average federal government revenue - $214 million
- Average number of employees - 9,200

2. Vendor Products and Services

Vendors indicated that they currently provide and plan on providing the following categories of products and services.

	Percent Providing	
	1990	**1995**
Hardware	85	85
Software	85	85
Professional Services	85	77
Local-Area Networks	77	69
Voice Services	69	69
Data Network Services	69	77

B
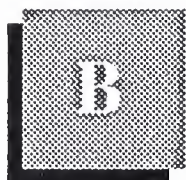
Telecommunications Funding Requests (From FY 1991, A-11, 43B Submissions)

Agency/Dept	Project	Funding ($ Thousands)
Air Force	Local-Area Network	18,489
	Joint Uniform Services Technical Information System (JUSTIS)	2,895
	Initial Computer Support for WWMCCS	7,997
	Base Telecommunications Centers	49,137
	Communications Link Interface System	2,602
	AFOSI Global Computer Network	5,748
	AF Equipment Management System (AFEMS)	64,496
	Large Computing Capability for the Air Force Institute of Technology	11,408
Army	Corps of Engineers Automation Plan - 1A (CEAP-1-A)	4,119
	AWIS/Local-Area Network (LAN)	4,350

Agency/Dept	Project	Funding ($ Thousands)
Navy	Naval Surface Weapons Center (NSWC) Center-Wide-Area Network (CWAN) Operations	26,800
	Telecommunications Network/ Line Consolidation	9,673
Agriculture	Greenbook	1,488
	Telephone Charges	74,095
	Data Communications Charges	3,082
	Automate Office Operations in NASS	944
	State Statistical Office	18,960
	Local-Area Networks	
	Administrative Operation	5,291
	Leasing, Timesharing & Telecommunications	15,653
	Local-Area Network	414
	Local-Area Network (LAN) for HQ USDA	2,376
	Office Automation Strategy	7,010
	Distributed Processing Telecommunications Network	600
	Telecommunications Facilities (Site Preparation)	8,950
	Voice Communications Charges	
	FTS	18,414
	Upgrade Minicomputer System	952
	Agricultural Information Network	733
	FTS Voice Communications	12,400

Agency/Dept	Project	Funding ($ Thousands)
Agricuture	DEPNET Telecommunications System (AGCRONET will replace)	6,600
	Department LAN	361
	LAN for Human Resources Division	67
	Telephone & Telecommunications Facilities	7,370
	Network for HQ and Field	125
	Information and Management Network	130
	Network Computer System	1,950
Commerce	ADP/Telecommunications Requirements for the River and Flood Forest and Warning System	9,511
	Telecommunication Requirements for the National Weather Service	64,200
	Operational Support for the Next Generation Weather Radar (NEXRAD)	21,485
Education	General Electronic Support	7,809
	Office Automation	31,614
Energy	Digital PBX	11,375
	Microwave Radio Network	16,471
	Secure Automatic Communications Network (SACNET) Upgrade	7,154
	Security Enhancement	6,490

Agency/Dept	Project	Funding ($ Thousands)
Energy	Oakridge Operations Integrated Communications Network (ORO-ICN)	23,024
	Telecommunications Services	57,000
	Telephone System	36,659
	Integrated Communications System (Lawrence Berkeley Laboratory)	9,196
	Local-Area Network	4,665
	Open Data System (Research Development & Testing)	8,522
	Voice & Open Data-Switching System	11,800
	Voice Cable System	6,500
	Very-High-Speed Data Communications Project	24,820
	Livermore Laboratories Information Exchange (LLIX)	98,195
	Los Alamos Integrated Communications System (LAICS)	45,161
EPA	Data Communications Network	51,000
	Telecommunications Systems Replacement and Modification	9,000
GSA	Reimbursement Information Processing, Data Communications and Networking, and Systems and Programming Support	235,176
	GSA System (GSAS)	11,040
	Intercity Services Program	3,381,227
	Local Telecommunication Services Program	1,691,971

Agency/Dept	Project	Funding ($ Thousands)
GSA	Information Security Management Program	153,129
	National Security Emergency Preparedness Program	14,315
HHS	Telephone Systems for SSA's Program Service Centers	11,296
	National "800" Initiative	226,800
	Monthly Telephone Charges	227,929
	Maintenance of SSA-Owned Telephone Equipment	38,667
	Reprocurement of Telephone Systems	5,963
	Records Management System	17,135
	DHHS Switch Procurement-Maryland	7,693
	Office Automation and End-User Computing	5,900
	Systems Support Contract(s)	11,399
	Local-Area Network Installation and Support	11,213
	Data Communications Network Services	151,127
	Teleprocessing Services Recompetition	9,300
Interior	Automated Land & Mineral Records System (ALMRS)	157,650
	Data Communications	7,719
	Telephone Systems	5,150
	Distributed Information System II (DIS II)	85,110
	GEONET 2	8,660

Agency/Dept	Project	Funding ($ Thousands)
Justice	ADP & Telecommunications	11,258
	Data Communications	25,626
Labor	BLS Communications Network	5,961
	ADP Services Recompetition	19,593
	GSA - FTS 2000	23,500
NASA	ADP Activity, Purchase of Software, Data Entry, Keypunch, Other Equipment	10,895
	Network Miscellaneous Support System, Purchase ADP Hardware	10,520
	Multi-Satellite Operations Control Center, Purchase ADP Hardware	14,902
	Command Management System/ Purchase ADP Hardware	14,050
	Network Operations Control Center System, Purchase ADP Hardware	6,500
	Center Information Network, Purchase ADP Hardware	10,266
	Software Development Network, Purchase ADP Hardware	52,108
State	Foreign Affairs Information System (FAIS)	48,204
Transportation	LAN Backbone	1,200
	Integrated Services Digital Network (ISDN)	2,500
	Hybrid Data Network	8,000
	Lease of Equipment	8,434
	Com. Leased Telecommunications CG Field Units	59,313

Agency/Dept	Project	Funding ($ Thousands)
Treasury	Secret Service Integrated Network	38,427
	Counsel Automated System Environment	47,846
	Integrated Telecommunications Services	713,321
VA	Veterans Benefits Administration Modernization Plan	75,223
	VADATS/IDCU	170,200
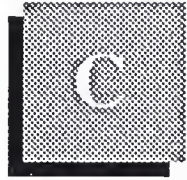
Definitions

The definitions in this appendix include hardware, software, services, and telecommunications categories to accommodate the range of information systems and services programs described in this report.

Alternate service mode terminology employed by the federal government in its procurement process is defined along with INPUT's regular terms of reference, as shown in Exhibit C-1.

The federal government's unique nontechnical terminology that is associated with applications, documentation, budgets, authorization, and the procurement/acquisition process is included in Appendix D, Glossary of Acronyms.

EXHIBIT C-1

Federal Information Systems and Services Program
Systems and Services

```
┌─────────────┐                              ┌─────────────┐
│   Telecom   │                              │  Hardware   │
│  Services   │                              │  (Systems)  │
└──────┬──────┘                              └──────┬──────┘
       │                                            │
   ┌───┴────┐                              ┌─────────┴────────┐
┌──────────┐ ┌──────────┐          ┌──────────┐      ┌──────────┐
│ Switched │ │Dedicated │          │Mainframe │      │  Micro-  │
│ Networks │ │ Networks │          │          │      │ computer │
└────┬─────┘ └────┬─────┘          └────┬─────┘      └────┬─────┘
     │            │                     │                 │
┌──────────┐ ┌──────────┐        ┌──────────┐       ┌──────────┐
│  Common  │ │Local-Area│        │Mini-     │       │ Personal │
│ Carrier  │ │ Networks │        │computer  │       │ Computer │
└──────────┘ └──────────┘        └──────────┘       └──────────┘
┌──────────┐ ┌──────────┐        ┌──────────┐       ┌──────────┐
│Value-Added│ │ Remote  │        │  Large   │       │Workstation│
│ Networks │ │ Networks │        │ Computer │       │          │
└──────────┘ └──────────┘        └──────────┘       └──────────┘
                                 ┌──────────┐       ┌──────────┐
                                 │  Super-  │       │   Word   │
                                 │ computer │       │Processor │
                                 └──────────┘       └──────────┘
                                 ┌──────────┐
                                 │ Systems  │
                                 │ Software │
                                 └──────────┘
                                 ┌──────────┐       ┌──────────┐
                                 │   Mass   │       │  Front/  │
                                 │ Storage  │       │Back-End  │
                                 │          │       │Processors│
                                 └──────────┘       └──────────┘
                                      ┌──────────┐
                                      │Peripherals│
                                      └──────────┘
┌──────────┐                          ┌──────────┐
│   OCR    │                          │ Printer  │
└──────────┘                          └──────────┘
┌──────────┐   ┌──────────┐           ┌──────────┐
│ Keyboard │   │   Tape   │           │ Plotter  │
│          │   │  Drive   │           │          │
└──────────┘   └──────────┘           └──────────┘
┌──────────┐   ┌──────────┐           ┌──────────┐
│  Modem   │   │   Disk   │           │Large Screen│
│          │   │  Drive   │           │ Display  │
└──────────┘   └──────────┘           └──────────┘
```

EXHIBIT C-1 Cont.

Federal Information Systems and Services Program
Systems and Services

Integrated Systems
- **Professional Services**
  - Systems Engineering
  - Systems Integration
  - Software Development
  - Installation
  - Training
  - Maintenance
- **Turnkey Systems**
  - Training
  - Maintenance
- **Systems Hardware**
  - Systems Software
  - Application Software
  - Installation

Professional Services
- **Contract Services**
  - Software Development
  - Consulting
  - Systems Design
  - Education & Training
  - Documentation
- **Systems Integration**
  - Integration & Engineering
  - Application Software
  - Education & Training
- **Facilities Management**
  - Facilities Control
  - Operations & Maintenance
  - Programming & Analysis
  - Repair & Replacement

EXHIBIT C-1 Cont.

Federal Information Systems and Services Program
Systems and Services

A
Delivery Modes

Processing Services - This category includes transaction processing, utility processing, other processing services, and processing facilities management.

- Transaction Processing Services - Updates client-owned data files by entry of specific business activity, such as sales order, inventory receipt, cash disbursement, etc. Transactions may be entered in one of three modes.

  - *Interactive* - Characterized by the interaction of the user with the system, primarily for problem-solving timesharing, but also for data entry and transaction processing; the user is on-line to the program files. Computer response is usually measured in seconds or fractions of a second.

  - *Remote Batch* - Where the user hands over control of a job to the vendor's computer, which schedules job execution according to priorities and resource requirements. Computer response is measured in minutes or hours.

  - *User Site Hardware Services (USHS)* - Those offerings provided by processing services vendors that place programmable hardware at the user's site rather than at the vendor's data center. Some vendors in the federal government market provide this service under the label of distributed data services. USHS offers:

    - Access to a communications network

    - Access through the network to the RCS vendor's larger computers

    - Local management and storage of a data base subset that will service local terminal users via the connection of a data base processor to the network

    - Significant software as part of the service

- *Utility Processing* - Vendor provides access to basic software tools enabling the users to develop their own problem solutions such as language compilers, assemblers, DBMSs, sorts, scientific library routines, and other systems software.

"Other" Processing Services include:

- *Batch Services* - These include data processing at vendors' sites for user programs and/or data that are physically transported (as opposed to transported electronically by telecommunications media) to and/or from those sites. Data entry and data output services, such as keypunching and computer output microfilm processing, are also included. Batch

services include expenditures by users who take their data to a vendor site that has a terminal connected to a remote computer for the actual processing. Other services also includes disaster recovery and backup services.

- *Systems Operations (Processing)* - Also referred to as "Resource Management," Facilities Management or "COCO" (contractor-owned, contractor-operated). Systems control is the management of all or part of a user's data processing functions under a long-term contract of not less than one year. This would include remote computing and batch services. To qualify, the contractor must directly plan, control, operate, and own the facility provided to the user either on-site, through communications lines, or in a mixed mode.

Processing services are further differentiated as follows:

- *Cross-industry* services involve the processing of applications that are targeted to specific user departments (e.g., finance, personnel, sales) but that cut across industry lines. Most general-ledger, accounts receivable, payroll, and personnel applications fall into this category. Cross-industry data base services, for which the vendor supplies the data base and controls access to it (although it may be owned by a third party), are included in this category. General-purpose tools such as financial planning systems, linear regression packages, and other statistical routines are also included. However, when the application, tool, or data base is designed for specific industry use, then the service is industry-specific (see below).

- *Industry-specific* services provide processing for particular functions or problems unique to an industry or industry group. Specialty applications can be either business or scientific in orientation. Industry-specific data base services, for which the vendor supplies the data base and controls access to it (although it may be owned by a third party), are also included under this category. Examples of industry-specific applications are seismic data processing, numerically controlled machine tool software development, and demand deposit accounting.

Network Services include a wide variety of network-based functions and operations. Network services are divided into two segments: value-added networks (enhanced services), and network applications (electronic information services).

- *Value-Added Networks (VANs)* - VANs typically involve common carrier network transmission facilities that are augmented with computerized switches. These networks have become associated with packet-switching technology because the public VANs that have received the most attention (e.g., Sprint (Telenet) and BT/Tymnet) employ packet-switching techniques. However, other added data service features such

as store-and-forward message switching, terminal interfacing, error detection and correction, and host computer interfacing are of equal importance.

- *Network applications* include electronic data interchange (EDI), the application-to-application electronic communications between organizations, based on established business document standards and electronic mail.

Software products - This category includes user purchases of applications and systems software packages for in-house computer systems. Included are lease and purchase expenditures, as well as expenditures for work performed by the vendor to implement or maintain the package at the user's sites. Expenditures for work performed by organizations other than the package vendor are counted in the category of professional services. Fees for work related to education, consulting, and/or custom modification of software products are counted as professional services, provided such fees are charged separately from the price of the software product itself. There are several subcategories of software products, as indicated below and shown in detail in Exhibit B-2.

- *Applications Products* - Software that performs functions directly related to solving users' business or organizational need. The products can be:

  - *Cross-Industry Products* - Used in multiple-industry applications as well as the federal government sector. Examples are payroll, inventory control, and financial planning.

  - *Industry-Specific Products* - Used in a specific industry sector, such as banking and finance, transportation, or discrete manufacturing. Examples are demand deposit accounting, airline scheduling, and material resource planning.

- *Systems Software Products* - Software that enables the computer/ communications system to perform basic functions. These products include:

  - System Control Products - Function during applications program execution to manage the computer system resources. Examples include operating systems, communication monitors, emulators, spoolers, network control, library control, windowing, access control.

  - Data Center Management Products - Used by operations personnel to manage the computer systems resources and personnel more effectively. Examples include performance measurement, job accounting, computer operations scheduling, utilities, capacity management.

- *Applications Development Products* - Used to prepare applications for execution by assisting in designing, programming, testing, and related functions. Examples include traditional programming languages, 4GLs, sorts, productivity aids, assemblers, compilers, data dictionaries, data base management systems, report writers, project control, and CASE systems.

Professional Services - This category includes consulting, education and training, software development, and systems operations as defined below.

- *Software development* - Develops a software system on a custom basis. It includes one or more of the following: user requirements definition, system design, contract programming, documentation, and software maintenance.

- *Education and Training* - Products and/or services related to information systems and services for the user, including computer-aided instruction (CAI), computer-based education (CBE), and vendor instruction of user personnel in operations, programming, and maintenance.

- *Consulting Services* - Information systems and/or services management consulting, project assistance (technical and/or management), feasibility analyses, and cost-effectiveness trade-off studies.

- *Systems Operations (Professional Services)* - This is a counterpart to systems operations (processing services) except the computing equipment is owned or leased by the client, not by the vendor. The vendor provides the staff to operate, maintain, and manage the client's facility.

Turnkey Systems - A turnkey system is an integration of systems and applications software with CPU hardware and peripherals, packaged as a single application (or set of applications) solution. The value added by the vendor is primarily in the software and support. Most CAD/CAM systems and many small-business systems are turnkey systems. This does not include specialized hardware systems such as word processors, cash registers, or process control systems, nor does it include Embedded Computer Resources for military applications. Turnkey systems may be either custom or packaged systems.

- Hardware vendors that combine software with their own general-purpose hardware are not classified by INPUT as turnkey vendors. Their software revenues are included in the appropriate software category.

- Turnkey systems revenue is divided into two categories:

  - Industry-specific systems - that is, systems that serve a specific function for a given industry sector such as automobile dealer parts inventory, CAD/CAM systems, or discrete manufacturing control systems.

  - *Cross-industry systems* - that is, systems that provide a specific function that is applicable to a wide range of industry sectors such as financial planning systems, payroll systems, or personnel management systems.

- Revenue includes hardware, software, and support functions.

Systems Integration: A business offering that provides a complete solution to a complex information system, networking, or automation requirement through the custom selection and implementation of a variety of information products and services.

B
Hardware/Hardware Systems

Hardware - Includes all computer and telecommunications equipment that can be separately acquired with or without installation by the vendor and not acquired as part of an integrated system.

- *Peripherals* - Includes all input, output, communications, and storage devices (other than main memory) that can be connected locally to the main processor, and generally cannot be included in other categories such as terminals.

- *Input Devices* - Includes keyboards, numeric pads, card readers, light pens and track balls, tape readers, position and motion sensors, and analog-to-digital converters.

- *Output Devices* - Includes printers, CRTs, projection television screens, micrographics processors, digital graphics, and plotters.

- *Communication Devices* - Includes modems, encryption equipment, special interfaces, and error control.

- *Storage Devices* - Includes magnetic tape (reel, cartridge, and cassette), floppy and hard disks, solid state (integrated circuits), and bubble and optical memories.

Terminals - Three types of terminals are described below:

○ *User-Programmable* - Also called intelligent terminals, including:

- Single-station or standalone
- Multistation shared processor
- Teleprinter
- Remote batch

● *User Nonprogrammable*

- Single-station
- Multistation shared processor
- Teleprinter

● *Limited Function* - Originally developed for specific needs, such as point-of-sale (POS), inventory data collection, controlled access, and other applications.

Hardware Systems - Includes all processors from microcomputers to supercomputers. Hardware systems may require type- or model-unique operating software to be functional, but this category excludes applications software and peripheral devices, other than main memory and processors or CPUs not provided as part of an integrated (turnkey) system.

○ *Microcomputer* - Combines all of the CPU, memory, and peripheral functions of an 8-, 16-, or 32-bit computer on a chip in the form of:

- Integrated circuit package

- Plug-in boards with more memory and peripheral circuits

- Console including keyboard and interfacing connectors

- Personal computer with at least one external storage device directly addressable by the CPU

- An embedded computer which may take a number of shapes or configurations

Microcomputers are primarily single-user computers that cost under $15,000.

● *Midsize Computer* - Typically a 32- or 64-bit computer with extensive applications software and a number of peripherals in standalone or multiple-CPU configurations for business (administrative, personnel, and logistics) applications; also called a general-purpose computer.

Specific systems in this category are: IBM 93XX systems, all Digital VAX series systems, and such common UNIX-based systems as from Apollo and Sun are also included. Most large shared-logic, integrated office systems-such as those from Wang, Hewlett-Packard, and Groupe Bull-would also be considered midsize systems. Does not include microcomputers (standalone, or shared), embedded systems, and CAD/CAM systems.

- *Large Computer* - Presently centered around storage controllers but likely to become bus-oriented and to consist of multiple processors or parallel processors. Intended for structured mathematical and signal processing and typically used with general-purpose, VonNeumann-type processors for system control. Usually refers to traditional mainframes (such as IBM 30XX, Unisys (Sperry) 1100/XX, Honeywell DDPS88, Unisys (Burroughs) A15, or CDC Cyber series) and supercomputers (such as products from Cray, ETA, Fujitsu, and the new IBM development effort).

- *Supercomputer* - High-powered processors with numerical processing throughput that is significantly greater than the fastest general-purpose computers, with capacities in the 100-500 million floating point operations per second (MFLOPS) range. Newer supercomputers, with burst modes over 500 MFLOPS, main storage size up to 10 million words, and on-line storage in the one-to-three gigabyte class, are labeled Class IV to Class VII in agency long-range plans. Supercomputers fit in one of two categories:

  - *Real Time* - Generally used for signal processing in military applications.

  - *Non-Real Time* - For scientific use in one of three configurations:

    - Parallel processors
    - Pipeline processor
    - Vector processor

  - *Supercomputer* - Term applied to micro, mini, and large mainframe computers with performance substantially higher than attainable by VonNeuman architectures.

- *Embedded Computer* - Dedicated computer system designed and implemented as an integral part of a weapon, weapon system, or platform; critical to a military or intelligence mission such as command and control, cryptological activities, or intelligence activities. Characterized by military specifications (MIL SPEC) appearance and operation, limited but reprogrammable applications software, and permanent or semi-permanent interfaces. May vary in capacity from microcomputers to parallel processors computer systems.

C

Telecommunications

Networks - Electronic interconnection between sites or locations that may incorporate links between central computer sites and remote locations and switching and/or regional data processing nodes. Network services are typically provided by a vendor to move data, voice, video, or textual information between locations. Networks can be categorized in several different ways.

- *Common Carrier Network* - A public access network, such as provided by AT&T, consisting of conventional voice-grade circuits and regular switching facilities accessed through dial-up calling with leased or user-owned modems.

- *Value-Added Network (VAN)* - (See listing under Section B, Delivery Modes.)

- *Local-Area Network (LAN)* - Limited-access network between computing resources in a relatively small (but not necessarily contiguous) area, such as a building, complex of buildings, or buildings distributed within a metropolitan area. Uses one of two signaling methods:

  - *Baseband* - Signaling using digital waveforms on a single frequency band, usually at voice frequencies and bandwidth, and limited to a single sender at any given moment. When used for local-area networks, typically implemented with TDM to permit multiple access.

  - *Broadband* - Transmission facilities that use frequencies greater than normal voice-grade, supported in local-area networks with RF modems and AC signaling. Also known as wideband. Employs multiplexing techniques that increase carrier frequency between terminals to provide:

    - Multiple (simultaneous) channels via FDM (Frequency Division Multiplexing)

    - Multiple (time-sequenced) channels via TDM (Time Division Multiplexing)

    - High-speed data transfer rate via parallel mode at rates of up to 96,000 baud (or higher, depending on media)

- *Wide-Area Network (WAN)* - Limited access network between computing resources in buildings, complexes of buildings, or buildings within a large metropolitan or wide geographical area. Uses baseband or broadband signaling methods.

Transmission Facilities - Includes wire, carrier, coaxial cable, micro-
wave, optical fiber, satellites, cellular radio, and marine cable operating
in one of two modes depending on the vendor and the distribution of the
network.

- *Mode* - may be either:

  - *Analog* - Transmission or signal with continuous-waveform repre-
    sentation, typified by the distribution systems of many telephone
    operating companies.

  - *Digital* - Transmission or signal using discontinuous, discrete quanti-
    ties to represent data, which may be voice, data, video, or text, in
    binary form.

- *Media* - May be any of the following:

  - *Wire* - Varies from earlier single-line teletype networks, to two-wire
    standard telephone (twisted pair), to four-wire full-duplex balanced
    lines.

  - *Coaxial Cable* - A cable used in HF (high frequency) and VHF (very
    high frequency), single-frequency, or carrier-based systems; requires
    frequent reamplification (repeaters) to carry the signal any distance.

  - *Microwave* - UHF (ultra high frequency) multichannel, point-to-
    point, repeated radio transmission, also capable of wide frequency
    channels.

  - *Optical Fiber* - Signal distribution systems, using light-transmitting
    glass fibers and TDM for multichannel applications.

  - *Communications Satellites* - Synchronous earth-orbiting systems that
    provide point-to-point, two-way service over significant distances
    without intermediate amplification (repeaters), but requiring suitable
    groundstation facilities for up- and down-link operation.

  - *Cellular Radio* - Network of fixed, low-powered two-way radios that
    are linked by a computer system to track mobile phone/data set units.
    Each radio serves a small area called a cell. The computer switches
    service connections to the mobile unit from cell to cell.

D

General Definitions

103/113 - Bell standard modem for low-speed transmission up to 300 bps, asynchronous, half or full duplex.

212 - Bell standard for medium-speed transmission at 1200 bps, asynchronous or synchronous, half or full duplex.

ASCII - American National Standards Code for Information Interchange-eight-bit code with seven data bits and one parity bit.

Asynchronous - Communications operation (such as transmission) without continuous timing signals. Synchronization is accomplished by appending signal elements to the data.

Bandwidth - Range of transmission frequencies that can be carried on a communications path; used as a measure of capacity.

Baud - Number of signal events (discrete conditions) per second. Typically used to measure modem or terminal transmission speed.

Benchmark - Method of testing proposed ADP system solutions for a specified set of functions (applications) employing simulated or real data inputs under simulated operating conditions.

BPS - Bits per second - also mbps and kbps, million bits per second and thousand bits per second, respectively.

BSC - IBM's binary synchronous communications data link protocol. First introduced in 1968 for use on point-to-point and multipoint communications channels. Frequently referenced as "bisync."

Byte - Usually equivalent to the storage required for one alphanumeric character (i.e., one letter or number).

CBX - Computerized Branch Exchange - a PABX based on a computer system, implying programmability and usually voice and data capabilities.

Central Processing Unit (CPU) - The arithmetic and control portion of a computer; i.e., the circuits controlling the interpretation and execution of computer instructions.

Centrex - Central office telephone services that permit local circuit switching without installation of customer premises equipment. Could be described as shared PBX service.

Circuit Switching - A process that, usually on demand, connects two or more network stations and permits exclusive circuit use until the connection is released; typical of the voice telephone network where a circuit is established between the caller and the called party.

CO - Central Office - local telco site for one or more exchanges.

CODEC - Coder/decoder, equivalent to modem for digital devices.

Constant Dollars - Growth forecasts in constant dollars make no allowance for inflation or recession. Dollar value based on the year of the forecast unless otherwise indicated.

Computer System - The combination of computing resources required to perform the designed functions and which may include one or more CPUs, machine room peripherals, storage systems, and/or applications software.

CPE - Customer Premises Equipment - DCE or DTE located at a customer site rather than at a carrier site such as the local telephone company CO. May include switchboards, PBX, data terminals, and telephone answering devices.

CSMA/CD - Carrier Sense Multiple Access/Collision Detect. Contention protocol used in local-area networks, typically with a multipoint configuration.

Current Dollars - Estimates or values expressed in current-year dollars which, for forecasts, would include an allowance for inflation.

Data Encryption Standard (DES) - 56-bit key, one-way encryption algorithm adopted by NBS in 1977, implemented through hardware ("S-boxes") or software. Designed by IBM with NSA guidance.

Datagram - A self-contained packet of information with a finite length that does not depend on the contents of preceding or following packets.

DCA - IBM's Document Content Architecture - protocols for specifying document (text) format which are consistent across a variety of hardware and software systems within IBM's DISOSS.

DCE - Data Circuit-Terminating Equipment - interface hardware that couples DTE to a transmission circuit or channel by providing functions to establish, maintain, and terminate a connection, including signal conversion and coding.

DDCMP - Digital Data Communications Message Protocol - data link protocol used in Digital Equipment Company's DECNET.

DECNET - Digital Equipment Company's network architecture.

Dedicated Circuit - A permanently established network connection between two or more stations; contrast with switched circuit.

DEMS - Digital Electronic Message Service - nationwide common carrier digital networks which provide high-speed, end-to-end, two-way transmission of digitally encoded information using the 10.6 GHz band.

DIA - IBM's Document Interchange Architecture - protocols for transfer of documents (text) between different hardware and software systems within IBM's DISOSS.

DISOSS - IBM's DIStributed Office Support System - office automation environment, based on DCA and DIA, which permits document (text) transfer between different hardware and software systems without requiring subsequent format or content revision.

Distributed Data Processing - The development of programmable intelligence in order to perform a data processing function where it can be accomplished most effectively through computers and terminals arranged in a telecommunications network adapted to the user's characteristics.

DTE - Data Terminal Equipment - hardware which is a data source or link or both, such as video display terminals that convert user information into data for transmission and reconvert data signals into user information.

EBCDIC - Extended Binary Coded Decimal Interchange Code - fifteen-bit code typically used in IBM mainframe environments.

EFT - Electronic funds transfer.

Encryption - Electrical, code-based conversion of transmitted data to provide security and/or privacy of data between authorized access points.

End User - One who is using a product or service to accomplish his or her own functions. The end user may buy a system from the hardware supplier(s) and do his or her own programming, interfacing, and installation. Alternately, the end user may buy a turnkey system from a systems house or hardware integrator, or may buy a service from an in-house department or external vendor.

Engineering Change Notice (ECN) - Product changes to improve the product after it has been released to production.

Engineering Change Order (ECO) - The follow-up to ECNs—they include parts and a bill of materials to effect the change in the hardware.

Equipment Operators - Individuals operating computer control consoles and/or peripheral equipment (BLS definition).

Ethernet - Local-area network developed by Xerox PARC using baseband signaling, CSMA/CD protocol, and coaxial cable to achieve a 10 mbps data rate.

Facsimile - Transmission and reception of data in graphic form, usually fixed images of documents, through scanning and conversion of a picture signal.

FDM - Frequency Division Multiplexing - a multiplexing method that permits multiple access by assigning different frequencies of the available bandwidth to different channels.

FEP - Front-End Processor - communications concentrator such as the IBM 3725 or COMTEN 3690 used to interface communications lines to host computers.

Field Engineer (FE) - Field engineer, customer engineer, serviceperson, and maintenance person are used interchangeably and refer to the individual who responds to a user's service call to repair a device or system.

Full-Duplex - Bidirectional communications with simultaneous two-way transmission.

General-Purpose Computer System - A computer designed to handle a wide variety of problems. Includes machine room peripherals, systems software, and small business systems.

Half-Duplex - Bidirectional communications, but only in one direction at a time.

Hardware Integrator - Develops system interface electronics and controllers for the CPU, sensors, peripherals, and all other ancillary hardware components. The hardware integrator also may develop control system software in addition to installing the entire system at the end-user site.

HDLC - High-Level Data Link Control.

Hertz - Number of signal oscillations (cycles) per second - abbreviated Hz.

IBM Token Ring - IBM's local-area network using baseband signalling and operating at 4 mbps on twisted-pair copper wire. Actually a combination of star and ring topologies that is IEEE 802.5-compatible.

IDN - Integrated Digital Network - digital switching and transmission; part of the evolution to ISDN.

Independent Suppliers - Suppliers of machine room peripherals - usually do not supply general purpose computer systems.

Information Processing - Data processing as a whole, including use of business and scientific computers.

Installed Base - Cumulative number or value (cost when new) of computers in use.

Interconnection - Physical linkage between devices on a network.

Interoperability - The capability to operate with other devices on a network. To be contrasted with interconnection, which refers to the ability to connect a device to a network and, more recently, to connect different networks (specifically public data networks) together.

ISDN - Integrated Services Digital Network - integrated voice and non-voice public network service which is completely digital. Not clearly defined through any existing standards although FCC and other federal agencies are participating in the development of CCITT recommendations.

Keypunch Operators - Individuals operating keypunch machines (similar in operation to electric typewriters) to transcribe data from source materials onto punch cards.

Lease Line - Permanent connection between two network stations. Also known as dedicated or non-switched line.

Machine Repairers - Individuals who install and periodically service computer systems.

Machine Room Peripherals - Peripheral equipment that is generally located close to the central processing unit.

Mainframe - The central processing unit (CPU or units in a parallel processor) of a computer that interprets and executes computer (software) instructions of 32 bits or more. Usually refers to traditional mainframes (such as IBM 30XX, Unisys (Sperry) 1100/XX, Honeywell DDPS88, Unisys (Burroughs) A15, or CDC (Cyber series).

MAP - Manufacturing Automation Protocol - seven-layer communications standard for factory environments promoted by General Motors/ EDS. Adopts IEEE 802.2 and IEEE 802.4 standards plus OSI protocols for other layers of the architecture.

Mean Time to Repair - The mean of elapsed times from the arrival of the field engineer on the user's site until the device is repaired and returned to user service.

Mean Time to Respond - The mean of elapsed times from the user call for services and the arrival of the field engineer on the user's site.

Message - A communication intended to be read by a person. The quality of the received document need not be high, only readable. Graphic materials are not included.

MMFS - Manufacturing Messaging Format Standard - application-level protocol included within MAP.

Modem - A device that encodes information into electronically transmittable form (MOdulator) and restores it to original analog form (DEModulator).

NCP - Network Control Program - software used in IBM 3705/3725 FEPs for control of SNA networks.

Node - Connection point of three or more independent transmission points which may provide switching or data collection.

Off-Line - Pertaining to equipment or devices that can function without direct control of the central processing unit.

On-Line - Pertaining to equipment or devices under direct control of the central processing unit.

OSI - ISO reference model for Open Systems Interconnection - seven-layer architecture for application, presentation, session, transport, network, data link, and physical services and equipment.

OSI Application Layer - Layer 7, providing end-user applications services for data processing.

OSI Data Link Layer - Layer 2, providing transmission protocols, including frame management, link flow control, and link initiation/release.

OSI Network Layer - Layer 3, providing call establishment and clearing control through the network nodes.

OSI Physical Layer - Layer 1, providing the mechanical, electrical, functional, and procedural characteristics to establish, maintain, and release physical connections to the network.

OSI Presentation Layer - Layer 6, providing data formats and information such as data translation, data encoding/decoding, and command translation.

OSI Session Layer - Layer 5, establishes, maintains, and terminates logical connections for the transfer of data between processes.

OSI Transport Layer - Layer 4, providing end-to-end terminal control signals such as acknowledgements.

Overseas - Not within the geographical limits of the continental United States, Alaska, Hawaii, and U.S. possessions.

PABX - Private Automated Branch Exchange - hardware that provides automatic (electro-mechanical or electronic) local circuit switching on a customer's premises.

PAD - Packet Assembler-Disassembler - a device that enables DTE not equipped for packet-switching operation to operate on a packet-switched network.

PBX - Private Branch Exchange - hardware which provides local circuit switching on the customer premise.

PCM - Pulse-Code Modulation - modulation involving conversion of a waveform from analog to digital form through coding.

PDN - Public Data Network - a network established and operated by a recognized private operating agency, a telecommunications administration, or other agency for the specific purpose of providing data transmission services to the public. Also used to refer to a packet switch or value-added network.

Peripherals - Any unit of input/output equipment in a computer system, exclusive of the central processing unit.

PPM - Pulse Position Modulation.

Private Network - A network established and operated for one user or user organization.

Programmers - Persons mainly involved in designing, writing, and testing of computer software programs.

Protocols - The rules for communication system operation that must be followed if communication is to be effected. Protocols may govern portions of a network or service. In digital networks, protocols are digitally encoded as instructions to computerized equipment.

Public Network - A network established and operated for more than one user with shared access, usually available on a subscription basis. See related definition of PDN.

Scientific Computer System - A computer system designed to process structured mathematics, such as Fast Fourier Transforms, and complex, highly redundant information, such as seismic data, sonar data, and radar, with large on-line memories and very high capacity throughput.

SDLC - Synchronous Data Link Control - IBM's data link control for SNA. Supports a subset of HDLC modes.

SDN - Software-Defined Network.

Security - Physical, electrical, and computer (digital) coding procedures to protect the contents of computer files and data transmission from inadvertent or unauthorized disclosure to meet the requirements of the Privacy Act and national classified information regulations.

Service Delivery Point - The location of the physical interface between a network and customer/user equipment.

Simplex - Undirectional communications.

Smart Box - A device for adapting existing DTE to new network standards such as OSI. Includes PADs and protocol convertors, for example.

SNA - Systems Network Architecture—seven-layer communications architecture designed by IBM. Layers correspond roughly but not exactly to OSI model.

Software - Computer programs.

Supplies - Includes materials associated with the use or operations of computer systems, such as printer paper, keypunch cards, disk packs, and tapes.

Switched Circuit - Temporary connection between two network stations established through dial-up procedures.

Synchronous - Communications operation with separate, continuous clocking at both sending and receiving stations.

Systems Analyst - Individual who analyzes problems to be converted to a programmable form for application to computer systems.

Systems House - Vendor that acquires, assembles, and integrates hard-ware and software into a total system to satisfy the data processing requirements of an end user. The vendor also may develop systems software products for license to end users. The systems house vendor does not manufacture mainframes.

Systems Integrator - Systems house vendor that develops systems inter-face electronics, applications software, and controllers for the CPU, peripherals, and ancillary subsystems that may have been provided by a contractor or the government (GFE). This vendor may either supervise or perform the installation and testing of the completed system.

TI - Bell System designation for 1.544 mbps carrier capable of handling 24 PCM voice channels.

TDM - Time Division Multiplexing - a multiplexing method that inter-weaves multiple transmissions on a single circuit by assigning a different time slot to each channel.

Token Passing - Local-area network protocol which allows a station to transmit only when it has the "token," an empty slot on the carrier.

TOP - Technical Office Protocol - protocol developed by Boeing Com-puter Services to support administrative and office operations as comple-mentary functions to factory automation implemented under MAP.

Turnkey System - System composed of hardware and software integrated into a total system designed to completely fulfill the processing require-ments of a single application.

Twisted-Pair Cable - Communications cabling consisting of pairs of single-strand metallic electrical conductors, such as copper wires, typi-cally used in building telephone wiring and some LANs.

Verification and Validation - Process for examining and testing applica-tions and special systems software to verify that it operates on the target CPU and performs all of the functions specified by the user.

Voice-Grade - Circuit or signal in the 300-3300 Hz bandwidth typical of the public telephone system - nominally a 4 KHz user.

VTAM - Virtual Telecommunications Access Method - host-resident communications software for SNA networks.

E

Other Considerations

When questions arise as to the proper place to count certain user expenditures, INPUT addresses the questions from the user viewpoint. Expenditures then are categorized according to what the users perceive they are buying.

C-24

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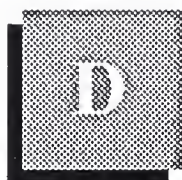
Glossary of Acronyms

The federal government's procurement language uses a combination of acronyms, phrases, and words that is complicated by different agency definitions and interpretations. The government also uses terms of accounting, business, economics, engineering, and law with new applications and technology.

Acronyms and contract terms that INPUT encountered most often in program documentation and interviews for this report are included here, but this glossary should not be considered all-inclusive. Federal procurement regulations (DAR, FPR, FAR, FIRMR, FPMR) and contract terms listed in RFIs, RFPs, and RFQs provide applicable terms and definitions.

Federal agency acronyms have been included to the extent they are employed in this report.

A

Federal Acronyms		
AAS	Automatic Addressing System.
AATMS	Advanced Air Traffic Management System.
ACO	Administrative Contracting Offices (DCAS).
ACS	Advanced Communications Satellite (formerly NASA 30/20 GHzSatellite Program).
ACT-1	Advanced Computer Techniques (Air Force).
Ada	DoD High-Order Language.
ADA	Airborne Data Acquisition.
ADL	Authorized Data List.
ADS	Automatic Digital Switches (DCS).
AFA	Air Force Association.
AFCEA	Armed Forces Communications Electronics Association.
AGE	Aerospace Ground Equipment.
AIP	Array Information Processing.
AIS	Automated Information System.
AMPE	Automated Message Processing Equipment.

AMPS	Automated Message Processing System.
AMSL	Acquisition Management Systems List.
ANG	Army National Guard.
AP(P)	Advance Procurement Plan.
Appropriation	Congressionally approved funding for authorized programs and activities of the Executive Branch.
APR	Agency Procurement Request.
ARPANET	DARPA network of scientific computers.
ASP	Aggregated Switch Procurement.
ATLAS	Abbreviated Test Language for All Systems (for ATE-Automated Test Equipment).
Authorization	In the legislative process programs, staffing, and other routineactivities must be approved by Oversight Committees before the Appropriations Committee will approve the money from the budget.
AUSA	Association of the U.S. Army.
AUTODIN	AUTOmatic DIgital Network of the Defense Communications System.
AUTOSEVOCOM	AUTOmatic SEcure VOice COMmunications Network.
AUTOVON	AUTOmatic VOice Network of the Defense Communications System.
BA	Basic Agreement.
BAFO	Best And Final Offer.
Base Level	Procurement, purchasing, and contracting at the military installation level.
BCA	Board of Contract Appeals.
Benchmark	Method of evaluating ability of a candidate computer system to meet user requirements.
Bid protest	Objection (in writing, before or after contract award) to some aspect of a solicitation by a valid bidder.
BML	Bidders Mailing List - qualified vendor information filed annually with federal agencies to automatically receive RFPs and RFQs in areas of claimed competence.
BOA	Basic Ordering Agreement.
B&P	Bid and Proposal - vendor activities in response to government solicitation/specific overhead allowance.
BPA	Blanked Purchase Agreement.
Budget	Federal Budget, proposed by the President and subject to Congressional review.
C2	Command and Control.
C3	Command, Control, and Communications.

C4	Command, Control, Communications, and Computers.
C3I	Command, Control, Communications, and Intelligence.
CAB	Contract Adjustment Board or Contract Appeals Board.
CADE	Computer-Aided Design and Engineering.
CADS	Computer-Assisted Display Systems.
CAIS	Computer-Assisted Instruction System.
CALS	Computer-aided Automated Logistic System.
CAPS	Command Automation Procurement Systems.
CAS	Contract Administration Services or Cost Accounting Standards.
CASB	Cost Accounting Standards Board.
CASP	Computer-Assisted Search Planning.
CBD	Commerce Business Daily - U.S. Department of Commerce publication listing government contract opportunities and awards.
CBO	Congressional Budget Office.
CCEP	Commercial COMSEC Endorsement Program.
CCDR	Contractor Cost Data Reporting.
CCN	Contract Change Notice.
CCPDS	Command Center Processing and Display Systems.
CCPO	Central Civilian Personnel Office.
CCTC	Command and Control Technical Center (JCS).
CDR	Critical Design Review.
CDRL	Contractor Data Requirement List.
CFE	Contractor-Furnished Equipment.
CFR	Code of Federal Regulations.
CICA	Competition in Contracting Act.
CIG	Computerized Interactive Graphics.
CIR	Cost Information Reports.
CM	Configuration Management.
CMI	Computer-Managed Instruction.
CNI	Communications, Navigation, and Identification.
CO	Contracting Office, Contract Offices, or Change Order.
COC	Certificate of Competency (administered by the Small Business Administration).
COCO	Contractor-Owned, Contractor-Operated.
CODSIA	Council of Defense and Space Industry Associations.
COMSAT	Communications Satellite Corporation.
COMSEC	COMmunications SECurity.
CONUS	CONtinental United States.
COP	Capability Objective Package.
COTR	Contracting Officer's Technical Representative.

CP	Communications Processor.
CPAF	Cost-Plus-Award-Fee Contract.
CPFF	Cost-Plus-Fixed-Fee Contract.
CPIF	Cost-Plus-Incentive-Fee Contract.
CPR	Cost Performance Reports.
CPSR	Contractor Procurement System Review.
CR	Cost Reimbursement (Cost Plus Contract).
CSA	Combat or Computer Systems Architecture.
C/SCSC	Cost/Schedule Control System Criteria (also called "C-Spec").
CWAS	Contractor Weighted Average Share in Cost Risk.
DAL	Data Accession List.
DAR	Defense Acquisition Regulations.
DARPA	Defense Advanced Research Projects Agency.
DAS	Data Acquisition System.
DBHS	Data Base Handling System.
DCA	Defense Communications Agency.
DCAA	Defense Contract Audit Agency.
DCAS	Defense Contract Administration Services.
DCASR	DCAS Region.
DCC	Digital Control Computer.
DCP	Development Concept Paper (DoD).
DCS	Defense Communications System.
DCTN	Defense Commercial Telecommunications Network.
DDA	Dynamic Demand Assessment (Delta Modulation).
DDC	Defense Documentation Center.
DDL	Digital Data Link - A segment of a communications network used for data transmission in digital form.
DDN	Defense Data Network.
DDS	Dynamic Diagnostics System.
DECCO	DEfense Commercial Communications Office.
DECEO	DEfense Communications Engineering Office.
D&F	Determination and Findings - required documentation for approval of a negotiated procurement.
DIA	Defense Intelligence Agency.
DIF	Document Interchange Format, Navy-sponsored word processing standard.
DHHS	Department of Health and Human Services.
DIDS	Defense Integrated Data Systems.
DISC	Defense Industrial Supply Center.
DLA	Defense Logistics Agency.
DMA	Defense Mapping Agency.
DNA	Defense Nuclear Agency.
DO	Delivery Order.

DOA	Department of Agriculture (also USDA).
DOC	Department of Commerce.
DOE	Department of Energy.
DOI	Department of Interior.
DOJ	Department of Justice.
DOS	Department of State.
DOT	Department of Transportation.
DPA	Delegation of Procurement Authority (granted by GSA under FPRs).
DPC	Defense Procurement Circular.
DQ	Definite Quantity Contract.
DQ/PL	Definite Quantity Price List Contract.
DR	Deficiency Report.
DSCS	Defense Satellite Communication System.
DSN	Defense Switched Network.
DSP	Defense Support Program (WWMCCS).
DSS	Defense Supply Service.
DTC	Design-To-Cost.
ECP	Engineering Change Proposal.
ED	Department of Education.
EEO	Equal Employment Opportunity.
8(a) Set-Aside	Agency awards direct to Small Business Administration for direct placement with a socially/economically disadvantaged company.
EMC	Electro-Magnetic Compatibility.
EMCS	Energy Monitoring and Control System.
EO	Executive Order - Order issued by the President.
EOQ	Economic Ordering Quantity.
EPA	Economic Price Adjustment.
EPA	Environmental Protection Agency.
EPMR	Estimated Peak Monthly Requirement.
EPS	Emergency Procurement Service (GSA) or Emergency Power System.
EUC	End-User Computing, especially in DoD.
FA	Formal Advertising.
FAC	Facility Contract.
FAR	Federal Acquisition Regulations.
FCA	Functional Configuration Audit.
FCC	Federal Communications Commission.
FCDC	Federal Contract Data Center.
FCRC	Federal Contract Research Center.
FDPC	Federal Data Processing Center.
FEDSIM	Federal (Computer) Simulation Center (GSA).
FEMA	Federal Emergency Management Agency.
FFP	Firm Fixed-Price Contract (also Lump Sum Contract).

FIPS	NBS Federal Information Processing Standard.
FIPS PUBS	FIPS Publications.
FIRMR	Federal Information Resource Management Regulations.
FMS	Foreign Military Sales.
FOC	Final Operating Capability.
FOIA	Freedom of Information Act.
FP	Fixed-Price Contract.
FP-L/H	Fixed-Price - Labor/Hour Contract.
FP-LOE	Fixed-Price - Level-Of-Effort Contract.
FPMR	Federal Property Management Regulations.
FPR	Federal Procurement Regulations.
FSC	Federal Supply Classification.
FSG	Federal Supply Group.
FSN	Federal Supply Number.
FSS	Federal Supply Schedule or Federal Supply Service (GSA).
FSTS	Federal Secure Telecommunications System.
FT Fund	A revolving fund, designated as the Federal Telecommunications Fund, used by GSA to pay for GSA-provided common-user services, specifically including the current FTS and proposed FTS 2000 services.
FTSP	Federal Telecommunications Standards Program administered by NCS; Standards are published by GSA.
FTS	Federal Telecommunications System.
FTS 2000	Proposed replacement for the Federal Telecommunications System.
FY	Fiscal Year.
FYDP	Five-Year Defense Plan.
GAO	General Accounting Office.
GFE	Government-Furnished Equipment.
GFM	Government-Furnished Material.
GFY	Government Fiscal Year (October to September).
GIDEP	Government-Industry Data Exchange Program.
GOCO	Government Owned - Contractor Operated.
GOGO	Government Owned - Government Operated.
GOSIP	Government Open Systems Interconnection Profile.
GPO	Government Printing Office.
GPS	Global Positioning System.
GRH	Gramm-Rudman-Hollings Act (1985), also called Gramm-Rudman Deficit Control.
GS	General Schedule.
GSA	General Services Administration.

GSBCA	General Services Administration Board of Contract Appeals.
HCFA	Health Care Financing Administration.
HHS	(Department of) Health and Human Services.
HPA	Head of Procuring Activity.
HSDP	High-Speed Data Processors.
HUD	(Department of) Housing and Urban Development.
ICA	Independent Cost Analysis.
ICAM	Integrated Computer-Aided Manufacturing.
ICE	Independent Cost Estimate.
ICP	Inventory Control Point.
ICST	Institute for Computer Sciences and Technology, National Bureau of Standards, Department of Commerce.
IDAMS	Image Display And Manipulation System.
IDEP	Interservice Data Exchange Program.
IDN	Integrated Data Network.
IFB	Invitation For Bids.
IOC	Initial Operating Capability.
IOI	Internal Operating Instructions.
IPS	Integrated Procurement System.
IQ	Indefinite Quantity Contract.
IR&D	Independent Research & Development.
IRM	Information Resources Management.
IXS	Information Exchange System.
JFMIP	Joint Financial Management Improvement Program.
JOCIT	Jovial Compiler Implementation Tool.
JSIPS	Joint Systems Integration Planning Staff.
JSOP	Joint Strategic Objectives Plan.
JSOR	Joint Service Operational Requirement.
JUMPS	Joint Uniform Military Pay System.
LC	Letter Contract.
LCC	Life Cycle Costing.
LCMP	Life Cycle Management Procedures (DD7920.1).
LCMS	Life Cycle Management System.
L-H	Labor-Hour Contract.
LOI	Letter of Interest.
LRPE	Long-Range Procurement Estimate.
LRIRP	Long-Range Information Resource Plan.

MAISRC	Major Automated Information Systems Review Council (DoD).
MANTECH	MANufacturing TECHnology.
MAPS	Multiple Address Processing System.
MAP/TOP	Manufacturing Automation Protocol/Technical and Office Protocol.
MASC	Multiple Award Schedule Contract.
MDA	Multiplexed Data Accumulator.
MENS	Mission Element Need Statement or Mission Essential Need Statement (see DD-5000.1 Major Systems Acquisition).
MILSCAP	Military Standard Contract Administration Procedures.
MIL SPEC	Military Specification.
MIL STD	Military Standard.
MIPR	Military Interdepartmental Purchase Request.
MOD	Modification.
MOL	Maximum Ordering Limit (Federal Supply Service).
MPC	Military Procurement Code.
MYP	Multi-Year Procurement.
NARDIC	Navy Research and Development Information Center.
NASA	National Aeronautics and Space Administration.
NBS	National Bureau of Standards.
NCMA	National Contract Management Association.
NCS	National Communications System; responsible for setting U.S. Government standards administered by GSA; also holds primary responsibility for emergency communications planning.
NICRAD	Navy-Industry Cooperative Research and Development.
NIP	Notice of Intent to Purchase.
NMCS	National Military Command System.
NSA	National Security Agency.
NSEP	National Security and Emergency Preparedness.
NSF	National Science Foundation.
NSIA	National Security Industrial Association.
NTIA	National Telecommunications and Information Administration of the Department of Commerce Replaced the Office of Telecommunications Policy in 1970 as planner and coordinator for government communications programs. Primarily responsible for radio.
NTIS	National Technical Information Service.

Obligation	"Earmarking" of specific funding for a contract from committed agency funds.
OCS	Office of Contract Settlement.
OFCC	Office of Federal Contract Compliance.
Off-Site	Services to be provided near but not in government facilities.
OFMP	Office of Federal Management Policy (GSA).
OFPP	Office of Federal Procurement Policy.
OIRM	Office of Information Resources Management.
O&M	Operations & Maintenance.
OMB	Office of Management and Budget.
O,M&R	Operations, Maintenance, and Readiness.
On-Site	Services to be performed on a government installation or in a specified building.
OPM	Office of Procurement Management (GSA) or Office of Personnel Management.
Options	Sole-source additions to the base contract for services or goods to be exercised at the government's discretion.
OSHA	Occupational Safety and Health Act.
OSI	Open System Interconnect.
OSP	Offshore Procurement.
OTA	Office of Technology Assessment (Congress).
Out-Year	Proposed funding for fiscal years beyond the Budget Year (next fiscal year).
P-I	FY Defense Production Budget.
P3I	Pre-Planned Product Improvement (program in DoD).
PAR	Procurement Authorization Request or Procurement Action Report.
PAS	Pre-Award Survey.
PASS	Procurement Automated Source System.
PCO	Procurement Contracting Officer.
PDA	Principal Development Agency.
PDM	Program Decision Memorandum.
PDR	Preliminary Design Review.
PIR	Procurement Information Reporting.
PME	Performance Monitoring Equipment.
PMP	Purchase Management Plan.
PO	Purchase Order or Program Office.
POM	Program Objective Memorandum.
POSIX	Portable Open System Interconnection Exchange.
POTS	Purchase of Telephone Systems.
PPBS	Planning, Programming, Budgeting System.
PR	Purchase Request or Procurement Requisition.
PRA	Paperwork Reduction Act.

PS	Performance Specification - alternative to a Statement of Work, when work to be performed can be clearly specified.
QA	Quality Assurance.
QAO	Quality Assurance Office.
QMCS	Quality Monitoring and Control System (DoD software).
QMR	Qualitative Material Requirement (Army).
QPL	Qualified Products List.
QRC	Quick Reaction Capability.
QRI	Quick Reaction Inquiry.
R-I	FY Defense RDT&E Budget.
RAM	Reliability, Availability, and Maintainability.
RC	Requirements Contract.
R&D	Research and Development.
RDA	Research, Development, and Acquisition.
RDD	Required Delivery Date.
RD&E	Research, Development, and Engineering.
RDF	Rapid Deployment Force.
RDT&E	Research, Development, Test, and Engineering.
RFI	Request For Information.
RFP	Request For Proposal.
RFQ	Request For Quotation.
RFTP	Request For Technical Proposals (Two-Step).
ROC	Required Operational Capability.
ROI	Return On Investment.
RTAS	Real Time Analysis System.
RTDS	Real Time Display System.
SA	Supplemental Agreement.
SBA	Small Business Administration.
SB Set-Aside	Small Business Set-Aside contract opportunities with bidders limited to certified small businesses.
SCA	Service Contract Act (1964 as amended).
SCN	Specification Change Notice.
SDN	Secure Data Network.
SEC	Securities and Exchange Commission.
SE&I	Systems Engineering and Integration.
SETA	Systems Engineering/Technical Assistance.
SETS	Systems Engineering/Technical Support.
SIBAC	Simplified Intragovernmental Billing and Collection System.
SIMP	Systems Integration Master Plan.
SIOP	Single Integrated Operations Plan.
SNAP	Shipboard Nontactical ADP Program.
Sole Source Contract	Award without competition.

Solicitation Invitation	Invitation to submit a bid.
SOR	Specific Operational Requirement.
SOW	Statement of Work.
SSA	Source Selection Authority (DoD).
SSAC	Source Selection Advisory Council.
SSEB	Source Selection Evaluation Board.
SSO	Source Selection Official (NASA).
STINFO	Scientific and Technical INFOrmation Program - Air Force/NASA.
STU	Secure Telephone Unit.
SWO	Stop-Work Order.
Synopsis	Brief Description of contract opportunity in CBD after D&F and before release of solicitation.
TA/AS	Technical Assistance/Analysis Services.
TCP/IP	Transmission Control Protocol/Internet Protocol.
TEMPEST	Studies, inspections, and tests of unintentional electromagnetic radiation from computer, communication, command, and control equipment that may cause unauthorized disclosure of information; usually applied to DoD and security agency testing programs.
TILO	Technical and Industrial Liason Office-Qualified Requirement Information Program - Army.
TM	Time and Materials contract.
TOA	Total Obligational Authority (Defense).
TOD	Technical Objective Document.
TR	Temporary Regulation (added to FPR, FAR).
TRACE	Total Risk Assessing Cost Estimate.
TRCO	Technical Representative of the Contracting Offices.
TREAS	Department of Treasury.
TRP	Technical Resources Plan.
TSP	GSA's Teleprocessing Services Program.
TVA	Tennessee Valley Authority.
UCAS	Uniform Cost Accounting System.
USA	U.S. Army.
USAF	U.S. Air Force.
USCG	U.S. Coast Guard.
USMC	U.S. Marine Corps.
USN	U.S. Navy.
U.S.C.	United States Code.
USPS	United States Postal Service.
USRRB	United States Railroad Retirement Board.

VA	Veterans Affairs Department.
VE	Value Engineering.
VHSIC	Very High Speed Integrated Circuits.
VIABLE	Vertical Installation Automation BaseLine (Army).
VICI	Voice Input Code Identifier.
WBS	Work Breakdown Structure.
WGM	Weighted Guidelines Method.
WIN	WWMCCS Intercomputer Network.
WITS	Washington Interagency Telecommunications System.
WIS	WWMCCS Information Systems.
WS	Work Statement Offerer's description of the work to be done (proposal or contract).
WWMCCS	World-Wide Military Command and Control System.
ADAPSO	Association of Data Processing Service Organization, now the Computer Software and Services Industry Association.
ADP	Automatic Data Processing.
ADPE	Automatic Data Processing Equipment.
ANSI	American National Standards Institute.
BOC	Bell Operating Company.
CAD	Computer-Aided Design.
CAM	Computer-Aided Manufacturing.
CBEMA	Computer and Business Equipment Manufacturers Association.
CCIA	Computers and Communications Industry Association.
CCITT	Comite Consultatif Internationale de Telegraphique et Telephonique; Committee of the International Telecommunication Union.
COBOL	COmmon Business-Oriented Language.
COS	Corporation for Open Systems.
CPU	Central Processing Unit.
DBMS	Data Base Management System.
DRAM	Dynamic Random Access Memory.
EIA	Electronic Industries Association.
EPROM	Erasable Programmable Read-Only-Memory.

IEEE	Institute of Electrical and Electronics Engineers.
ISDN	Integrated Services Digital Networks.
ISO	International Organization for Standardization; voluntary international standards organization and member of CCITT.
ITU	International Telecommunication Union.
LSI	Large-Scale Integration.
MFJ	Modified Final Judgement.
PROM	Programmable Read-Only Memory.
RBOC	Regional Bell Operating Company.
UNIX	AT&T Proprietary Operating System.
UPS	Uninterruptable Power Source.
VAR	Value-Added Reseller.
VLSI	Very Large-Scale Integration.
WORM	Write-Once-Read-Many-Times.
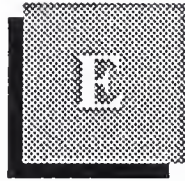
Policies, Regulations, and Standards

A-11	Preparation and Submission of Budget Estimates.
A-49	Use of Management and Operating Contracts.
A-71	Responsibilities for the Administration and Management of Automatic Data Processing Activities.
A-76	Policies for Acquiring Commercial or Industrial Products and Services Needed by the Government.
A-109	Major Systems Acquisitions.
A-120	Guidelines for the Use of Consulting Services.
A-121	Cost Accounting, Cost Recovery, and Integrated Sharing of Data Processing Facilities.
A-123	Internal Control Systems.
A-127	Financial Management Systems.
A-130	Management of Federal Information Resources.
A-131	Value Engineering.

The FIRMR as published by GSA is the primary regulation for use by federal agencies in the management, acquisition, and use of both ADP and telecommunications information resources.

DD-5000.1	Major System Acquisitions.
DD-5000.2	Major System Acquisition Process.
DD-5000.11	DoD Data Elements and Data Codes Standardization Program.
DD-5000.31	Interim List of DoD-Approved High-Order Languages.
DD-5000.35	Defense Acquisition Regulatory Systems.
DD-5200.1	DoD Information Security Program.
DD-5200.28	Security Requirements for Automatic Data Processing (ADP) Systems.
DD-5200.28-M	Manual of Techniques and Procedures for Implementing, Deactivating, Testing, and Evaluating Secure Resource Sharing ADP Systems.
DD-7920.1	Life Cycle Management of Automated Information (AIS).
DD-7920.2	Major Automated Information Systems Approval Process.
DD-7935	Automated Data Systems (ADS) Documentation.
ADCCP	Advanced Data Communications Control Procedures; ANSI Standard X3.66 of 1979; also NBS FIPS 71.
CCITT G.711	International PCM standard.
CCITT T.0	International standard for classification of facsimile apparatus for document transmission over telephone-type circuits.
DEA-1	Proposed ISO standard for data encryption based on the NBS DES.
EIA RS-170	Monochrome video standard.
EIA RS-170A	Color video standard.

EIA RS-464	EIA PBX standards.
EIA RS-465	Standard for Group III facsimile.
EIA RS-466	Facsimile standard; procedures for document transmission in the General Switched Telephone Network.
EIA RS-232-C	EIA DCE to DTE interface standard using a 25-Pin connector; similar to CCITT V-24.
EIA RS-449	New EIA standard DTE to DCE interface which replaces RS-232-C.
FED-STD 1000	Proposed Federal Standard for adoption of the full OSI reference model.
FED-STD 1026	Federal Data Encryption Standard (DES) adopted in 1983; also FIPS 46.
FED-STD 1041	Equivalent to FIPS 100.
FED-STD 1061	Group II Facsimile Standard (1981).
FED-STD 1062	Federal standard for Group III facsimile; equivalent to EIA RS-465.
FED-STD 1063	Federal facsimile standard; equivalent to EIA RS-466.
FED- STDs 1005, 1005A-1008	Federal Standards for DCE Coding and Modulation.
FIPS 46	NBS Data Encryption Standard (DES).
FIPS 81	DES Modes of Operation.
FIPS 100	NBS Standard for packet-switched networks; subset of 1980 CCITT X.25.
FIPS 107	NBS Standard for local area networks, similar to IEEE 802.2 and 802.3.
FIPS 146	Government Open Systems Interconnection (OSI) Profile (GOSIP).
FIPS 151	NIST POSIX (Portable Operating System Interface for UNIX) standard.

IEEE 802.2	OSI-Compatible IEEE standard for data-link control in local area networks.
IEEE 802.3	Local area network standard similar to Ethernet.
IEEE 802.4	OSI-compatible standard for token-bus local area networks.
IEEE 802.5	Local area networks standard for token-ring networks.
IEEE P1003.1	POSIX standard, similar to FIPS 151.
MIL-STD-188-114C	Physical interface protocol similar to RS-232 and RS-449.
MIL-STD-1777	IP-Internet Protocol.
MIL-STD-1778	TCP - Transmission Control Protocol.
MIL-STD-1780	File Transfer Protocol.
MIL-STD-1781	Simple Mail Transfer Protocol (electronic mail).
MIL-STD-1782	TELNET - virtual terminal protocol.
MIL-STD-1815A	Ada Programming Language Standard.
SVID	UNIX System Interface Definition.
X.12	ANSI standard for Electronic Data Interchange.
X.21	CCITT Standard for interface between DTE and DCE for synchronous operation on public data networks.
X.25	CCITT standard for interface between DTE and DCE for terminals operating in the packet mode on public data networks.
X.75	CCITT standard for links that interface different packet networks.
X.400	ISO Application-level standard for the electronic transfer of messages (electronic mail).

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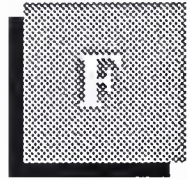
Related INPUT Reports

U.S. Information Services Vertical Markets, 1989

U.S. Information Services Cross-Industry Markets, 1988

Procurement Analysis Reports, GFY 1990-1995

U.S. Information Services Industry, 1988

Eighteenth Annual ADAPSO Survey of the Computer Services Industry

Directory of Leading U.S. Information Services Vendors, 1988

Federal Large-Scale Systems Market, 1988-1993

Federal Professional Services Market, 1989-1994

Federal Software and Related Services Market, 1989-1994

Federal Midsize Systems Market, 1988-1993

Federal Systems Integration Market, 1989-1994

Federal Telecommunications Market, 1988-1993

Federal Office Information Systems Market, 1988-1993

Federal Microcomputer Market, 1989-1994

Defense Logistics Agency Information Services Market

NASA Information Systems Market, 1988-1993

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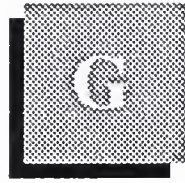
Questionnaires

Federal Agency Questionnaire
Federal Telecommunications Market 1990-1995

First, we would like your help to understand your planned expenditures for telecommunications. We would like to read a list of your agency's budget submissions and then ask two or three questions about the projects.

1. Based on our review of your agency's budget submissions, the following major programs are proposed for adding to or improving your agency's telecommunications services over the next five years. **Interviewer - Read the following list.**

Program	Annual Expense
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

2. Is this list current and complete?

    _____ Yes **(Go to 4)**
    _____ No

3. What programs should be added or removed? **(Interviewer Note - Add or delete programs from the list above)**

4.   Of your agency's total telecommunications expense, please estimate the percentage that is allocated for each of the following five categories in FY 90? **(Totals should equal 100%)**

Percent
_____ Voice
_____ Leased Circuit
_____ Value-Added Networks
_____ Hardware (Purchase and Lease)
_____ Software
_____ Professional Services (consulting, programming, etc.)

5.   For each of these five categories, please indicate whether you expect the amount spent to increase, decrease, or remain the same over the next five years.

	Increase	**Decrease**	**Same**
Voice	_____	_____	____
Leased Circuits	_____	_____	____
Value-Added Networks	_____	_____	____
Hardware	_____	_____	____
Software	_____	_____	____

Interviewer Note - For each category for which a decrease is noted, please ask why.

_____

_____

_____

_____

_____

6.   What percentage of your agency's data network requirements are currently being met by the following types of networks?

Percent
_____ FTS
_____ FTS 2000
_____ Autovon
_____ Autodin
_____ DDN
_____ Agency Specific
_____ Other (Specify): _____

7. What percentage of your agency's data network requirements will be met by types of networks in 1995?

    Percent
    _____ FTS
    _____ FTS 2000
    _____ Autovon
    _____ Autodin
    _____ DDN
    _____ Agency Specific
    _____ Other (Specify): _____

8. From your understanding of the services and capabilities provided as part of FTS 2000, please rate on a scale of 1-5 (1 being low) how well the FTS 2000 network will be able to meet your agency's data network needs over the next five years.

    _____ Rating (**Interviewer Note - If 3 or lower, ask why not higher?**)

    _____

    _____

    _____

9. Now considering your data networks, what percent is managed by in-house staff and what percentage is managed by a contractor? (For the purpose of this question, contractor can mean either another government agency or an independent contractor.)

    _____ % In-House
    _____ % Contractor (**Note - If 100% contractor, go to 13**)

10. Considering the portion of your networks that are managed by in-house staff, is the management process centralized or decentralized?

    _____ Centralized
    _____ Decentralized
    _____ Both (Explain _____)

11. Do you plan to implement centralized network management centers for your data networks over the next five years? Why or why not?

    _____ Yes
    _____ No

    Why? _____

    _____

    _____

12. Have you considered contracting for the management of your data networks with a third party? Why or why not?

_____ Yes
_____ No

Why? _____

_____

_____

13. Does your agency plan to use (or increase the use of) VANs over the next five years?

_____ Yes
_____ No

14. Does your agency currently use local-area networks (LANs)?

_____ Yes
_____ No **(Go to 18)**

15. Can you estimate the number of individual LANs that your agency has today?

_____ Number

16. What percentage of your LANs are integrated?

_____%

17. What percentage of your LANs do you expect to be integrated five years from now?

_____%

18. On a scale of 1-5 (1 being low), how important are integrated network services to your agency? (An integrated network is one which supports the transmission of voice, data and text data over the same network)

_____ Rating

19. Does your agency have any specific plans to integrate the agency's networks over the next five years?

_____ Yes
_____ No **(Go to 21)**

20.   Considering your agency's plans to integrate your telecommunictions networks, please rate on a scale of 1-5 (1=will not meet needs), which of the following approaches would best meet the agency's needs.

       _____ FTS 2000
       _____ In-house staff
       _____ Contractor
       _____ Other (Specify): _____

21.   Now, on the same scale (1-5), please rate your preference for each of the following as a means for acquiring additional, improved, or new telecommunications systems and services. (1=would prefer not to use, 5=most preferred means).

       _____ Use GSA- or DCA-sponsored facilities
       _____ Buy common carrier-provided services
       _____ Buy VAN services
       _____ Buy integrated systems (including hardware, software, circuits, etc.)
       _____ Buy components and integrate in-house
       _____ Have contractor integrate agency-bought components
       _____ Other (Specify _____)

22.   Does your agency currently use satellites as a means to meet the agency data networking needs?

       _____ Yes
       _____ No

23.   On a scale of 1-5 (1 being low) how important do you think satellites will be in meeting your agency's network requirements by 1995?

       _____ Rating (If 3 or lower, ask why not higher?)

       _____

       _____

       _____

24.   Has your agency considered the use of VSATs (very small aperature terminals) as a means to meet the agency data networking needs?

       _____ Yes
       _____ No

25.   On a scale of 1-5 (1 being low) how important do you think VSATs will be in meeting your agency's networking needs by 1995?

       _____ Rating (**If 3 or lower, ask why not higher?**)

       _____

       _____

       _____

26.   Does your agency currently use cellular communications services?

       _____ Yes
       _____ No

27.   On a scale of 1-5 (1 being low) how important do you think cellular communications will be in meeting your agency's telecommunications needs by 1995?

       _____ Rating (**If 3 or lower, ask why not higher?**)

       _____

       _____

       _____

28.   Please rate, on the same scale (1-5), the importance of the following two services to your agency over the next five years.

       _____ Electronic Mail
       _____ EDI (Electronic Data Interchange)

29.   In your opinion, please indicate on a scale of 1-5 (1 being not well at all), how well your agency uses telecommunications technology to meet the communications needs of the agency.

       _____ Rating (**If 3 or lower, ask why not higher?**)

       _____

       _____

       _____

30.   Now, in your opinion, what are the most significant factors that will affect your agency's use of telecommunications services over the next five years? (Top three). **Interviewer Note - Indicate either positive (P) or negative (N) factors. Circle P or N)**

       _____P N

       _____P N

       _____P N

31.   What would you consider to be the primary weaknesses of vendors that provide data network
        services to your agency? (Top three weaknesses)

        _____

        _____

        _____

32.   What are the most important products and services that vendors should be able to provide over
        the next five years? (**Interviewer Note - Consider factors such as new technology, cost,
        quality, training, support, etc.**)

        _____

        _____

        _____

One last question.

33.   What steps should vendors take to be more responsive to meeting your agency's telecommu-
        nications needs? (Top three.)

        _____

        _____

        _____

        Thank you for your time.

Vendor Questionnaire
Federal Telecommunications Market 1990-1995

1. Does your company currently provide or plan to provide telecommunications systems or services to the federal government?

    _____ Yes
    _____ No (End of Interview)

2. From the following listing, please identify the types of systems or services that you currently provide and plan to provide by 1995.

    Current   **1995**
    _____   _____ Hardware
    _____ _____   Software
    _____ _____   Professional Services (Consulting, Programming,   etc.)
    _____ _____   Voice Services
    _____ _____   Data Network Services
    _____ _____   Local-Area Networks

3. In your opinion, what will be the percentage increase or decrease in the federal telecommunications market over the next five years?

    _____ % Increase **(Go to 4)**
    _____ % Decrease **(Go to 5)**
    _____ Remain the Same **(Go to 6)**
    _____ Don't know **(Go to 6)**

4. Please identify the key factors that will contribute to growth of the federal telecommunications market? (Top three.)

    _____

    _____

    _____

5. What are the key factors that will contribute to a decline in growth of the federal telecommunications market? (Top three)

    _____

    _____

    _____

6.   In your opinion, which agencies provide the most attractive opportunities for telecommunications systems and services? Why?

       _____

       _____

       _____

7.   Government agencies have a number of alternatives available for changing or adding to their telecommunications resources. Please rate, on a scale of 1-5, your understanding of government agencies' preference for each of the following as a means of acquiring additional, improved, or new telecommunications systems and services. (1=prefer not to use, 5=highly preferred means).

       _____ Use GSA- or DCA-sponsored facilities
       _____ Buy common carrier-provided services
       _____ Buy VAN services
       _____ Buy integrated systems (including hardware, software, circuits, etc.)
       _____ Buy components and integrate in-house
       _____ Have contractor integrate agency-bought components
       _____ Other (Specify _____)

8.   There are numerous technologies or combinations of technologies and services that can be applied to meeting federal agency needs. I'd like you to rate on a scale of 1-5 how critical each of the following is in the federal market today. (1=not critical, 5=very high)

       _____ ISDN (Integrated Services Digital Network)
       _____ VAN services (Value-Added Network)
       _____ LANs (Local-Area Networks)
       _____ Satellite Networks
       _____ VSAT Networks
       _____ Cellular Telephone
       _____ Network Management Systems
       _____ Electronic Mail
       _____ Electronic Data Interchange

9.   Now, for each of the categories just mentioned, please rate on a scale of 1-5 (1 being not important), how critical each will be to meeting agency needs by 1995.

       _____ ISDN (Integrated Services Digital Network)
       _____ VAN services (Value-Added Networks)
       _____ LANs (Local-Area Networks)
       _____ Satellite Networks
       _____ VSAT Networks
       _____ Cellular Telephone
       _____ Network Management Systems
       _____ Electronic Mail
       _____ Electronic Data Interchange

10. Considering FTS 2000, the government's project to replace the federal telecommunications system, please rate, on a scale of 1-5, how effective FTS 2000 will be in meeting government needs over the next five years (1 being not effective at all).

_____ Rating (**If 3 or lower, ask why not higher?**)

_____

_____

_____

11. Now, also considering FTS 2000, please rate on a scale of 1-5, the effect that FTS 2000 has on your ability to market your services to the federal government. (1=no effect, 5=major effect).

_____ Rating (**If 3 or lower, ask why not higher?**)

_____

_____

_____

12. In your opinion, what are the most significant factors that will affect the government's use of telecommunications services over the next five years? (Top three.) **Interviewer Note - These can be either positive or negative factors.**

_____

_____

_____

13. Again, please rate on a scale of 1-5 (1 being low), how effectively the government uses telecommunications systems and services.

_____ Rating (**If 3 or lower, ask why not higher?**)

_____

_____

_____

14. In your opinion, what major steps should the federal government take to make more effective use of telecommunications?

_____

_____

_____

15.   In your opinion, what should vendors do to be more responsive to the federal government's telecommunications needs?

G-11

_____

_____

_____

16.   Please identify the percentage of federal government revenues that you receive from each of the following categories of services.

Percent
_____ Hardware
_____ Software
_____ Professional Services
_____ Voice Services
_____ Leased Circuit Services (Incl. satellite, VSAT, etc.)
_____ Value-Added Network Services
_____ Other (Specify _____)

17.   What was your company's total information systems and services revenue from federal business during your most recent fiscal year? Please indicate the year.

_____ $ (millions)
_____ Fiscal Year

About INPUT

Company Profile

INPUT provides planning information, analysis, and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions.

Continuous-information advisory services, proprietary research/consulting, merger/acquisition assistance, and multiclient studies are provided to users and vendors of information systems and sevices (software, processing services, turnkey systems, systems integration, professional services, communications, and systems/software maintenance and support).

Many of INPUT's professional staff have more than 20 years experience in their areas of specialization. Most have held management positions in large organizations, enabling them to supply practical solutions to complex business problems.

Formed as a privately held corporation in 1974, INPUT has become a leading international research and consulting firm. Clients include more than 100 of the world's largest and most technically advanced companies.

Staff Credentials

INPUT's staff have been selected for their broad background in a variety of functions, including planning, marketing, operations, and information processing. Many of INPUT's professional staff have held executive positions in some of the world's leading organizations, both as vendors and users of information services, in areas such as the following:

- Processing Services
- Professional Services
- Turnkey Systems
- Applications Software
- Field (customer) Service

- Banking and Finance
- Insurance
- Process Manufacturing
- Telecommunications
- Federal Government

Educational backgrounds include both technical and business specializations, and many INPUT staff hold advanced degrees.

| U.S. and European Advisory Services | INPUT offers the following advisory services on an annual subscription basis. |

INPUT offers the following advisory services on an annual subscription basis.

1. Market Analysis Program—U.S.
The Market Analysis Program provides up-to-date U.S. information services market analyses, five-year forecasts, trend analyses, vertical/cross-industry market reports, an on-site presentation, hotline inquiry service, and sound recommendations for action. It covers software, professional and network services, turnkey systems, and professional services markets. It is designed to satisfy the planning and marketing requirements of current and potential information services vendors.

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This program is designed to help vendors of software and services with their market planning. It examines the issues in the marketplace, from both a user and a vendor viewpoint. It provides detailed five-year market forecasts to help plan for future growth.

3. Vendor Analysis Program—U.S.
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4. Vendor Analysis Program—Europe
This is an invaluable service for gaining competitve information. Two binders are provided—one is a directory listing names, addresses, and turnover of some 700 European software and services vendors. The second binder contains profiles of about 300 key vendors.

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Focusing on what is fast becoming a major computer/communications market opportunity, this program keeps you well informed. Through monthly newsletters, timely news flashes, comprehensive studies, a joint user/vendor conference, and telephone inquiry privileges, you will be informed and stay informed about the events and issues impacting this burgeoning market.

6. Network Services Program—Europe
Network services is a fast-growing area of the software and services industry. This program is essential to vendors of EDI, electronic information services, and network products and services. It keeps clients informed of the latest developments and includes a monthly newsletter on EDI.

7. Systems Integration Program—U.S.
Focus is on the fast-moving world of systems integration and the provision of complex information systems requiring vendor management and installation of multiple products and services. The program includes an annual market analysis of the U.S. systems integration and operations markets, SI vendor profiles and updates, topical market analysis reports, and an annual SI seminar.

8. Systems Operations Program—U.S.
This program includes an annual market analysis report of the systems operations and systems integration market, SO vendor profiles and updates, reports on network management and SO management practices, and an annual SO seminar.

9. Systems Integration Program—Europe
Systems integration and systems operations (facilities management) are key growth areas for the decade. This program examines these two areas and analyzes current market trends, user needs, and vendor offerings.

10. Federal Information Systems and Services Program
This program presents highly specific information on U.S. federal government procurement practices, identifies information services vendor opportunities, and provides guidance from INPUT's experienced Washington professionals to help clients maximize sales effectiveness in the federal government marketplace.

11. Information Systems Program
ISP is designed for executives of large information systems organizations and provides crucial information for planning, procurement, and management decision making. This program is widely used by both user and vendor organizations.

12. Customer Service Program—International
This program provides customer service organization management with data and analyses needed for marketing, technical, financial, and organizational planning. The program pinpoints user perceptions of service received, presents vendor-by-vendor service comparisons, and analyzes and forecasts service markets for large systems, minicomputers, personal computer systems, and third-party maintenance. A monthly newsletter helps clients keep informed of the latest developments in the market.

13. Customer Service Program—Europe
Customer service is an expanding area. Companies are now expanding from hardware service to more software-related maintenance and professional services. This program helps vendors penetrate these new areas and provides guidelines for future market strategy. A monthly newsletter helps clients keep abreast of the latest developments in the market.

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Detailed analyses of market trends, forces driving the markets, problems, opportunities, and user expenditures are available for the following sectors:

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Transportation	Education
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Retail Distribution	Federal Government
Wholesale Distribution	State and Local Government
Banking and Finance	Other Industry Sectors

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- Criteria & Definitions
- Retainer and Fee-Based
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- More than 5,000 organizations, worldwide, have charted business directions based on INPUT's research and analysis.

- Many clients invest more than $50,000 each year to receive INPUT's recommendations and planning information.

- INPUT regularly conducts proprietary research for some of the largest companies in the world.

- INPUT has developed and maintains one of the most complete information industry libraries in the world (access is granted to all INPUT clients).

- INPUT clients control an estimated 70% of the total information industry market.

- INPUT analyses and forecasts are founded upon years of practical experience, knowledge of historical industry performance, continuous tracking of day-to-day industry events, knowledge of user and vendor plans, and business savvy.

- INPUT analysts accurately predicted the growth of the information services market—at a time when most research organizations deemed it a transient market. INPUT predicted the growth of the microcomputer market in 1980 and accurately forecasted its slowdown in 1984.

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